POLICY RESEARCH WORKING PAPER 2788

Macroeconomic Adjustment and the Poor

Analytical Issues and Cross-Country Evidence

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The World Bank
World Bank Institute
Economic Policy and Poverty Reduction Division
February 2002

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Abstract

Agénor studies the links between macroeconomic adjustment and poverty. First, he summarizes some of the recent evidence on poverty in the developing world. Second, he reviews the various channels through which macroeconomic policies affect the poor. Third, Agénor emphasizes the role of the labor market. He develops an analytical framework that captures some of the main features of the urban labor market in developing countries and studies the effects of fiscal adjustment on wages, employment, and poverty. Fourth, he presents cross-country regressions linking various macroeconomic and structural variables to poverty. The author finds that output growth and real exchange rate depreciations tend to lower poverty, while illiteracy, income inequality, and macroeconomic volatility tend to increase poverty. In addition, the impact of growth on poverty appears to be asymmetric, and to result from a significant relationship between episodes of increasing poverty and negative growth rates.

This paper—a product of the Economic Policy and Poverty Reduction Division, World Bank Institute—is part of a larger effort in the institute to analyze the impact of adjustment programs on poverty and income distribution. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Maria Gosiengfiao, room J4-282, telephone 202-473-3363, fax 202-676-9810, email address mgosiengfiao@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at pagenor@worldbank.org. February 2002. (82 pages)

Macroeconomic Adjustment and the Poor: Analytical Issues and Cross-Country Evidence

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JEL Classification Numbers: F41, J31, J64

*This paper dwells on some of my recent work on labor market segmentation and asymmetric shocks. I am grateful to Nihal Bayraktar for excellent research assistance.

1 Introduction

Understanding and assessing the poverty and distributional effects of macroeconomic adjustment programs remain issues of considerable importance for economists and policymakers alike. A key reason for this is the growing evidence that economic and financial crises hurt the poor most, because they often lack the means to protect themselves from adverse income and employment shocks. The poor lack assets (such as bank deposits or land) and often have no direct access to credit markets (or face prohibitive borrowing costs when they do), to smooth the impact of these shocks. For the very poor, unfavorable shocks may be large enough to result in actual declines in consumption, bringing it down below subsistence levels and exerting a detrimental effect on their longer term nutrition and health prospects. Moreover, due to the lack of education and marketable skills, the poor tend to be less mobile (across sectors and regions) than better-educated workers and are therefore often unable to switch jobs and capitalize on available employment opportunities. Finally, indirect sources of income and public transfers other than unemployment benefits may decline during crises, because during such episodes the ability of relatives (or local communities) to engage in resource sharing and income redistribution may be reduced, whereas governments may be forced to adjust drastically their fiscal accounts with across-the-board cuts in expenditure.

There is also growing recognition of the fact that assessing the benefits and costs of adjustment programs may entail *dynamic trade-offs*. In particular, it is now well recognized that the large budgetary cuts that have been associated in some cases with stabilization efforts have fallen to a significant extent on transfers to households and other types of social expenditure, thereby worsening the plight of lower-income groups in the short term. At the same time, however, it is also well understood that these groups tend to be the ones most adversely affected by high inflation, credit rationing, and excessively high interest rates, in part because of the effect of these variables on private sector activity and employment. To the extent that fiscal austerity leads to a durable reduction in the rate of inflation, higher credit to private firms, and to lower borrowing rates, the poor may benefit from government spending cuts in the longer run. It is therefore important to carefully evaluate the net benefits (in present value terms) that such trade-offs entail in designing adjustment programs.

Despite the importance of these issues, however, the evidence examining

the impact of adjustment programs (and macroeconomic policies in particular) on the poor remains relatively limited. Various country- (or region-) specific studies have been published in recent years, but they often remain highly descriptive when it comes to assessing the effect of macroeconomic and other structural variables on poverty. In addition, although it is well recognized that the poor often generate a sizable share of their income from wage employment, the role of the labor market in the transmission of macroeconomic policy shocks to lower-income groups (particularly those located in the urban sector) has not been fully explored in analytical and empirical models. Understanding this role is all the more important given the peculiarities and imperfections (which often result from government intervention) that often characterize the labor market in developing countries.

The present study attempts to contribute to the current debate at three levels. First, it provides an analytical overview of the various transmission channels of macroeconomic policy to the poor, dwelling in the process on the most recent analytical and empirical literature in this area. Second, it provides a formal analysis of the role of the labor market in the transmission of policy shocks to the urban poor, taking into account the type of distortions often observed in the developing world. Although the model is used to examine only the effect of a particular shock, it is sufficiently general to serve a variety of purposes. Third, it provides some new, quantitative evidence on the effect of macroeconomic factors on poverty.

The remainder of the paper is organized as follows. Section II provides a brief review of the recent evidence on poverty in developing countries. The various channels through which macroeconomic policies affect the poor are discussed in Section III. Both direct and indirect effects (through, for instance, inflation, aggregate demand, income distribution, and macroeconomic volatility), are analyzed. The role of the labor market is also discussed in general terms. Section IV develops an analytical framework that captures in a more formal way the role of the urban labor market in the transmission mechanism of macroeconomic policy shocks. The model incorporates several important and well-documented features of the labor market in developing countries: efficiency wages, a large informal sector, labor market segmentation, a heterogeneous and imperfectly mobile labor force, and wage flexibility in the informal economy.[1] The impact and steady-state effects of an increase

[1]Efficiency wage considerations have been much discussed in the recent literature on labor markets in developing countries (see Agénor (1996)). Rationales include better

in taxes—a typical measure in adjustment programs—are also examined. Section V provides some cross-section econometric evidence on the impact of macroeconomic factors and structural variables on poverty, including the degree of openness, school enrollment rates, real exchange rate depreciations, macroeconomic volatility, income inequality, and asymmetric movements in income levels and output growth. Finally, Section VI summarizes the main results of the analysis and elaborates on its policy implications.

2 Poverty: A Brief Overview

It is now well recognized that poverty is a multidimensional concept, encompassing not only insufficient income but also lack of access to adequate health services and sanitation, a high degree of illiteracy, and deprivation of basic rights and security (see World Bank (2000)). These dimensions of human deprivation interact in many important ways; for instance, improvements in health conditions lead to higher productivity and enhance the ability of workers to increase their incomes. Nevertheless, the focus of this brief overview will be limited to income poverty.

Figure 1 shows the evolution of poverty in various regions of the developing world during the period 1987-98. The indicator displayed is the headcount index (the proportion of individuals or households earning less than a given absolute level of income, or poverty line), which measures the *incidence* of poverty.[2] Extreme poverty (defined as living on less than $1 per day) is shown on the left-hand side, whereas relative poverty (defined as the share of people living on less than $2 per day) is shown on the right-hand side. Both indicators depict a similar picture: the incidence of poverty is the highest in South Asia and sub-Saharan Africa, and, apart from East Asia, little progress has been achieved during the period in reducing poverty rates. In sub-Saharan Africa, poverty has in fact increased slightly. Indeed, following a significant improvement in living standards during the 1970s and 1980s, extreme poverty declined only slowly in the developing world during the 1990s. The share of the world population living on less than $1 a day fell

nutrition, incentive and morale factors, adverse selection, turnover costs, and shirking costs. As discussed below, such considerations are particularly important for large, capital-intensive firms, which typically operate in the formal economy.

[2]See Ravallion (1994) for a discussion of this measure of poverty, as well as the poverty gap discussed later, and their limitations.

from 28 percent in 1987 to 23 percent in 1998, and the number of poor people remained roughly constant as the population increased. The share of people living on less than $2 per day (a more relevant threshold for middle-income economies such as those of East Asia and Latin America) showed roughly similar trends. At the same time, progress in alleviating poverty has been far from even across regions. Between 1987 and 1998, poverty rose rapidly in Eastern Europe and Central Asia, and continued to rise (albeit at a relatively low rate) in sub-Saharan Africa. In East Asia, the proportion of people in poverty (both extreme and relative) declined dramatically during the same period, despite the fact that the 1997-98 crisis slowed progress considerably. But in South Asia, where a significant proportion of the world's poor live, progress has been much less significant. And in Latin America, although the share of the population in poverty fell during the 1990s, the absolute number of poor people increased to 181 million (of which 90 million live in extreme poverty) in 1998, as a result of population growth (Wodon et al. (2001)).

2.1 Rural and Urban Poverty

The recent evidence also suggests that the distribution of the poor between rural and urban areas varies considerably across regions. This is particularly well illustrated when comparing Latin America and sub-Saharan Africa. In a country like Chile, for instance, poverty is evenly distributed between rural and urban areas (Anríquez, Cowan, and De Gregorio (1998)). By contrast, in sub-Saharan Africa, the poor tend to be concentrated in rural areas. According to the data compiled by Sahn, Dorosh, and Younger (1997, Chapter 2), for instance, the share of the national poverty rate accounted for by rural areas in the late 1980s and early 1990s was 78 percent in Côte d'Ivoire, 66 percent in Gambia, 72 percent in Ghana, 90 percent in Kenya and Tanzania, 88 percent in Madagascar, 98 percent in Malawi, and 71 percent in Zambia.[3] According to World Bank estimates, three-fourths of the poor in Côte d'Ivoire in 1995 were located in rural areas (World Bank (1997, p. 11)). At

[3]It should also be kept in mind that measures of rural and urban poverty rates—such as those discussed by Sahn et al. (1997, Chapter 2)—are often made on the basis of expenditure data that are not properly deflated across regions, owing to the lack of appropriate regional deflators. Accounting for the difference between the cost of living between urban and rural areas is nevertheless crucial for poverty assessment, in part because prices are typically higher in urban areas. Mazumdar (1993) for instance estimated that in Kenya in the late 1980s, the nominal income differential between rural and urban areas was as high as 4:1, and the cost of living in urban areas was 60 percent higher.

the same time, in many countries in sub-Saharan Africa—where both population and urbanization growth rates tend to be relatively high, compared to other regions of the developing world—the regional distribution of poverty in the past few years has been substantially affected by rapid rural-to-urban migration. In several cases, urban poverty, although not as severe as it is in rural areas, has become a major source of public concern. In Ghana for instance, the rural poverty rate was 34 percent in 1992, whereas the urban poverty rate was 26.5 percent (Canagarapajah and Mazumdar (1997)). Although rural poverty declined sharply between 1987 and 1992, little progress was achieved in reducing urban poverty during that period.

The sources of income of the rural poor and the urban poor also differ significantly. The rural poor in many countries in sub-Saharan Africa, for instance, are predominantly self-employed and continue to rely on direct earnings from agricultural production as their main source of income—although income from salaried employment and self-employment in small enterprises have become important in some countries.[4] The data compiled by Sahn et al. (1997) indicate that in countries like Côte d'Ivoire, Ghana, Guinea, Madagascar, and Tanzania, more than 90 percent of the rural workers were self-employed in the early 1990s, reflecting the predominance of own-account agriculture and, to a much lesser extent, small and micro enterprises in manufacturing and services. By contrast, the urban poor are typically self-employed workers in very small enterprises in the informal (nonwage) sector; but their incomes tend to fluctuate closely with changes in activity in the formal economy, because of the ease of entry in the informal sector and the degree of mobility of the labor force between the two sectors.

The distribution of poor households between rural and urban areas has important implications for studies aimed at assessing the effect of short-term stabilization policies on poverty. Income characteristics suggest, for instance, that the rural poor are less vulnerable, and the urban poor more vulnerable,

Without price indices (and thus relative weights) that account for consumption patterns in both areas, the difference between the incidence of poverty in rural and urban areas may be overstated.

[4]In Ghana, for instance, the sharp reduction in the rural poverty rate between 1987 and 1992 (from 42 percent to 34 percent) was the result of a significant increase in the income generated by the poor from non-farm self-employment. According to Canagarapajah and Mazumdar, (1997, p. 44), the share of such income in total household income increased from 19.5 percent in 1987-88 to 25.7 percent in 1991-92. At the same time, the share of income generated from farm self-employment fell during the same period from 60.4 percent to 53 percent

to macroeconomic policy shocks. The reason is that, unlike the urban poor, the rural poor can cushion the impact of an adverse shock to income on consumption by adjusting the share of their agricultural output that they keep for themselves.[5] At the same time, the urban poor tend to benefit more than the rural poor from food subsidies. Thus, large cuts in government subsidies may have a larger effect on the urban poor. This reasoning would suggest that studies focusing on the effects of macroeconomic adjustment on the poor may need to analyze separately the behavior of urban and rural poverty rates, with macroeconomic variables possibly playing a much less significant role in the former case.

2.2 How Did Growth Affect Poverty?

Figures 2 and 3 show the relationship between growth (as measured by the annual rate of change of real GNP per capita) and two measures of poverty: the headcount index (defined in the previous section) and the poverty gap index (that is, the average shortfall of the income of the poor with respect to the poverty line, multiplied by the headcount index), which measures the *depth* of poverty. Both extreme and relative poverty measures are used. The figures show no obvious pattern in the relation between growth and poverty. One reason that may explain this phenomenon is that growth was accompanied by significant changes in income distribution: while poverty could fall fairly rapidly with distributionally-neutral growth (indeed, one to one, as Dollar and Kraay (2001) claim to have found), it takes only small deviations from neutrality to wipe out those gains.

Latin America is a case in point. A recent study by Székely (2001) found that in 12 out of the 17 countries with available data in the region, moderate poverty did decline during the 1990s (with Chile, Dominican Republic, Panama, Uruguay and Brazil recording the largest reductions). But poverty increased in Peru, Mexico, Nicaragua, Venezuela, and El Salvador. In Latin America as a whole, the share of poor people declined by 10 percent between 1990 and 1999. However, no country in Latin America for which data on income distribution are available shows a decline in income inequality during the 1990s. Had inequality remained unchanged, poverty would have declined

[5] Of course, a reduction in the share of marketed agricultural output would also lower cash income and possibly force a reduction in the consumption of non-agricultural goods by the rural poor.

by more than it actually did. Growth would have lifted 90 million of individuals out of poverty, instead of 45 million. Thus, income inequality swept away many of the benefits of recent economic growth for large sectors of society in the region.

In Mexico, for instance, between 1996 and 1998, GDP per capita increased by 9.7 percent in real terms. However, poverty barely declined during that period. In fact, the incomes of the poorest 30 percent of the population actually fell. The increase in mean income was due entirely to income gains among the richest 30 percent (particularly the richest 10 percent) of the population. Another example is Chile. Between 1992 and 1996, GDP per capita increased by more than 30 percent in real terms. During the same period, moderate poverty (as defined above) declined from 20 percent to 16 percent—a 20 percent reduction in the proportion of poor. However, income inequality also increased during the period.[6] Had the income distribution remained the same as in 1992, the proportion of poor would have actually declined to 10 percent, rather than 16 percent. The poverty rate would have been cut in half, instead of by 20 percent. The link between poverty, growth, and inequality will be examined in the next sections, from both analytical and empirical standpoints.

3 Transmission Channels

Much progress has been achieved in recent years in understanding the various channels through which macroeconomic policy shocks are transmitted to output, employment, wages, and prices in a developing-country context (for an overview, see Agénor and Montiel (1999)). Several of these channels are relevant for understanding the impact of macro shocks on the poor, in both rural and urban areas. This section identifies these various channels, dwelling on a distinction between direct and indirect effects.

3.1 Direct Effects

The most direct channels through which macroeconomic adjustment programs affect the poor are public sector layoffs and freezes on the wage bill,

[6]By contrast, for the period between 1987 and 1992, Anríquez, Cowan, and De Gregorio (1998) suggested that in Chile up to 80 percent of the reduction of poverty was due to growth, with the rest due to changes in income distribution.

cuts in government expenditure on transfers and subsidies, and increases in public sector prices.[7]

3.1.1 Wage freeze, Layoffs, and Spending Cuts

Programs of fiscal consolidation often take the form of cuts in real wages in the public sector (by freezing the nominal wage bill in a context of non-zero inflation) and laying off unskilled and/or redundant employees. Wage cuts and layoffs may raise directly the poverty rate, particularly in the absence of a safety net (such as a government-run unemployment benefits scheme) or if they occur during periods of low activity (and thus low demand for labor). A cut in current transfers to low-income households reduces their resources directly, whereas a reduction in subsidies on goods or services that are consumed by the poor lowers their purchasing power.[8] Both may worsen poverty by forcing households to reduce consumption, with the latter effect depending of course on the consumption-expenditure pattern of the poor. As note earlier, to the extent that the urban poor benefit more from transfers and subsidies to begin with, urban poverty rates may be more adversely affected.

However, there are various factors suggesting that assessing the effect of macroeconomic policy on the poor by looking only at aggregate measures of public expenditure may be misleading. First, there is empirical evidence that social expenditure (including spending on education and health) benefits disproportionately to upper-income households. Camargo and Ferreira (2000) found that in Brazil, for instance, social expenditures are disproportionately appropriated by the middle classes and the rich. Li, Steele, and Glewwe (1999), in a study based on a relatively large group of developing countries, found that the share of the richest income quintile in public spending on education, at 28%, was more than double that of the poorest income quintile (13%). Similar results were obtained by Castro-Leal, Dayton, Demery and Mehra (1999) for a group of African countries. And in many Latin American countries, social security has long been "reserved" for relatively few workers in the formal sector and for government employees. In such conditions, large

[7] Government spending on transfers and subsidies also have an indirect effect on aggregate demand, and changes in public sector prices may have an indirect impact on other prices in the economy, as discussed later.

[8] Large reductions in subsidies have often been seen as a reflection of the lack of political influence of the poor and pressures exerted by more powerful interest groups.

cuts in social expenditure may have little impact on the poor.

Second, it may be argued that a wage freeze or layoffs of low-productivity workers, to the extent that they lower overall government expenditure and reduce pressures for monetization of the fiscal deficit, may lower inflation and therefore generate an indirect benefit for the poor (see below). The net welfare effect, therefore, is ambiguous because of conflicting effects on income. Third, in addition to the *level* effect associated with reductions in public expenditure, there may be a *compositional* effect: the share of social spending in total government expenditure may actually increase at the same time that overall spending is being cut.[9] Moreover, transfers and subsidies may fall both as a percentage of GDP and as a percentage of total government expenditure without any adverse effect on poverty if, at the same time, improved targeting of social spending takes place—thereby improving the flow of resources actually reaching the poor. Indeed, in some adjustment programs, expenditure reforms have entailed a redirection of health and education expenditures toward basic/preventive health care and primary education (which benefits the poor more than tertiary education), and an improvement in the targeting of social safety nets—notably by transforming generalized transfers to households into more targeted transfers to the very poor.

Clearly, expenditure reallocation continues to be a major issue in the design of adjustment programs—particularly, at the present time, in countries where debt relief, and associated fiscal savings, create new opportunities for reform and improved targeting. But the lack of political influence of the poor, and pressures exerted by more powerful interest groups, may continue to represent major stumbling blocks to pro-poor reallocations. The point, nevertheless, is that in cases where fiscal consolidation occurs in such a way that it benefits the poor, the net effect of adjustment may be beneficial—even if the relative level of public expenditure falls.

3.1.2 Increases in Public Sector Prices

Increases in prices of goods and services produced by the public sector—such as utilities and other types of public services, such as toll roads—often figure prominently in macroeconomic and structural adjustment programs, particularly when large fiscal imbalances prevail at the inception of the program and

[9] Conversely, of course, social spending may fall more than proporationally during periods of fiscal consolidation. Ravallion (2000) documents the experience of Argentina during the 1980s and 1990s, where pro-poor social spending fell significantly.

public enterprises provide large transfers to the government. Because they reduce the purchasing power of the poor, they hurt them directly. By how much poverty rises will depend ultimately on the consumption-expenditure pattern of the poor and their ability to "smooth" consumption through dissavings and borrowing. Once again, however, if the increase in public sector prices leads to a lower fiscal deficit and reduced inflationary pressures, the net effect on the poor may be positive in the medium term.

3.2 Indirect Effects

Indirect effects of macroeconomic policy on the poor operate through changes in aggregate demand and output (assuming that excess capacity exists initially) and employment; changes in the rate of economic growth; changes in inflation and the relevant expenditure price deflator for the poor; changes in the real exchange rate; macroeconomic volatility; and distributional effects.[10] In addition, output and employment effects associated with stabilization policies may be asymmetric—imparting some degree of "hysterisis" to the behavior of poverty rates.

3.2.1 Aggregate Demand and Employment

The effects of stabilization programs on poverty operating through aggregate demand and employment may occur through various channels. The first category of effects results essentially from reductions in transfers and subsidies (as noted earlier) and in government expenditure other than wages and salaries. The most important part of the latter component relates to capital spending—cuts in which have often been large in practice, due to the difficulty of compressing the wage bill. By reducing aggregate demand and employment, poverty may increase—again, particularly so if an adequate social safety net is not in place.

The second category of effects through which macroeconomic policy affects aggregate demand operates through changes in private spending. First,

[10]Indirect effects through portfolio shifts (and capital gains and losses) are typically limited because the poor hold their assets mostly in the form of noninterest-bearing money or bank deposits. There may, of course, be a large effect on *relative* poverty (that is, income distribution) through this channel, to the extent that upper-income groups hold more diversified portfolios of assets.

there are several channels through which lower public spending can lead to a reduction in private expenditure:

- If public investment and private sector investment are complementary (particularly with regard to public investment in infrastructure, as the evidence for developing countries suggests), a cut in public investment outlays—in addition to its direct effect on aggregate demand indicated earlier—may reduce the productivity of the private capital stock at the margin, and thus reduce private expenditure and aggregate demand.

- An increase in direct taxes aimed at reducing fiscal imbalances, such as an increase in tax rates on wages or profits, may reduce private expenditure on consumption and investment, by reducing expected income and the net rate of return on capital.

- Restrictive credit and monetary policies may lower private expenditure on consumption and investment, either directly (if credit availability effects are important) or by raising interest rates (which translate into a higher cost of capital).[11]

However, there are also several channels through which public expenditure cuts can lead to higher private expenditure:

- As implied by Ricardian equivalence, a reduction in public expenditure (such as a cut in capital spending, as noted earlier) may lead to an equal reduction in perceived tax liabilities by the private sector—either because of an immediate reduction in taxes currently paid, or in the future owing to lower financing needs to retire public debt—current or future private disposable income will increase, resulting in an increase in private spending. The net effect on aggregate demand would thus be ambiguous.[12]

- The fall in domestic activity associated with a reduction in public spending at the original level of prices and interest rates could also

[11] These effects may be exacerbated in the presence of wage and price stickiness (resulting, for instance, from the prevalence of nominal contracts), which imply larger quantity adjustments in the short run.

[12] The evidence favoring the Ricardian Equivalence proposition in developing countries is, however, rather weak; see Agénor (2000, Chapter 1)).

lead to an increase in private expenditure. For instance, if domestic interest rates adjust downward immediately to maintain portfolio equilibrium with a reduction in the demand for money, interest-sensitive components of aggregate demand would tend to increase—or, alternatively, if portfolio imbalances tend to persist, the excess supply of money may cause households to increase current spending in order to lower their real holdings of money balances (real balance effect). The net, general equilibrium effect on aggregate demand would, again, be ambiguous.

- Even in the absence of a real balance effect, the reduction in financing requirements by the public sector may reduce the cost, or increase the availability, of financial resources for the private sector, thereby increasing private spending and the ability to produce (if production was, to begin with, constrained by the ability to finance working capital needs).

- If prices are flexible, or if the cut in public spending was foreseen at the time that currently prevailing nominal wage contracts were agreed upon, the domestic price level could fall sufficiently to increase private spending, thereby mitigating the impact of the cut in public spending on total aggregate demand.

The foregoing discussion suggests, therefore, that the effects of stabilization policies on poverty operating though changes in aggregate demand are less clear-cut than is often thought. Although there are various channels through which such policies may reduce aggregate demand and worsen poverty (by reducing output and employment), there are also channels through which they may lead to an increase in aggregate demand and lower unemployment. Moreover, to the extent that reductions in aggregate demand associated with macroeconomic policy also lead to a fall in inflationary pressures (as discussed below) they may also benefit the poor.

3.2.2 Economic Growth

Macroeconomic policies may affect the poor not only through their impact on the *level* of output but also its *growth rate* over time. There are several channels through which this can occur. Sustained reductions in transfer payments from the public sector to the poor may have an adverse effect not

only on the level of income of the poor but also on their propensity to save. In turn, lower savings rates may affect negatively the growth rate of output, as emphasized in endogenous growth models (see Agénor (2000, Chapter 11)).[13] Similarly, to the extent that cuts in public sector investment (particularly in infrastructure) may reduce private investment, as indicated earlier, they may lower the rate of economic growth. Tax increases encourage evasion and the shifting of activities to the informal economy; as can be inferred from the analysis in Barro (1990) and Loayza (1996), the loss in tax revenue may, in the longer run, reduce the government's capacity to invest in infrastructure and thus lower the rate of economic growth if, again, there is complementary between public and private capital formation. In all these cases, by reducing the economy's growth rate, macroeconomic adjustment may have an adverse impact on poverty.

At the same time, however, the lower inflation rates that tend to be associated with macroeconomic adjustment may increase growth rates through their effect on the level and efficiency of investment, as documented in a number of analytical and empirical studies (see, for instance, Choi, Smith, and Boyd (1996)). Moreover, to the extent that adjustment reduces the degree of macroeconomic volatility (as discussed later), it may also have a positive effect on growth.

3.2.3 Inflation and Expenditure Deflators

The poor are more vulnerable to inflation than higher-income groups as a result of a variety of factors:

- Their income (wages or income from self-employment) is often defined in nominal terms, and they often do not benefit from indexation mechanisms. In periods of high inflation, therefore, the purchasing power of their resources may fall dramatically.[14]

- They have few inflation hedges—few real assets, such as land, and usually no indexed financial assets—with which to insulate themselves from the effect of price increases.

[13] However, this effect is probably relatively small in practice, due to the fact the savings rates of the poor are low to begin with.

[14] For Latin America, see in particular Cardoso (1992) and Morely (1995).

- Their holdings of cash balances are subject to the inflation tax, which, although not usually accounted for in standard measures of poverty, could have a significant negative effect on the welfare of the poor.[15]

All three factors suggest that inflation stabilization would benefit the poor proportionately more than upper-income groups. However, a number of mitigating factors should be taken into account. First, in countries where the poor are self-employed (either in the informal urban sector or in agriculture, as in many sub-Saharan African countries) and fairly "biased" expenditure patterns, what matters is not so much the increase in the overall level of prices but rather the extent to which prices of the goods and services that the poor consume (that is, a properly-weighted expenditure deflator) increase. If, for instance, basic staple foods account for a large share of expenditure of low-income households, and if the prices of these commodities are kept under control, disinflation may have little impact on the poor. Second, to the extent that macroeconomic adjustment entails a sharp drop in aggregate demand and employment (as discussed earlier), the excess supply of labor may, everything else equal, lead to further downward pressure on wages and a worsening of the plight of the poor. Finally, even if higher inflation has an adverse effect on poverty in the longer run, the foregoing discussion suggests that reducing inflation from a high to a low level may not be beneficial in the short run, to the extent that it is brought about through extensive cuts in social programs. Thus, as I stressed in the introduction, there is a dynamic trade-off, which suggests that it is the *net* present value of a reduction in inflation that needs to be assessed, in order to determine if stabilization from high inflation is indeed beneficial to the poor.

The situation is, in fact, more complicated than that, because lower inflation also contributes indirectly to growth, as shown empirically in studies such as those of Bruno and Easterly (1998) and Sarel (1996). Higher growth rates increase the level of income per capita, and the higher level of income tends to lower measured poverty rates, in the absence of adverse shifts in inequality (see below). As noted earlier, inflation may affect growth rates through its impact on the level and efficiency of investment. More specifically, suppose that inflation drives a wedge between the marginal returns to real and financial capital. It thus distorts production incentives. The

[15]However, it is possible (at least in principle) that the inflation tax revenue serves to finance a higher level of public expenditure that benefits the poor directly—thereby mitigating the adverse, partial equilibrium effect of the tax on welfare.

elimination of this distortion increases both the level and the rate of growth of output. In the model developed by Gylfason (1996)—in which both real and financial capital are used as inputs in the production process—increased price stability improves the efficiency with which capital is utilized, and thus increases the full-employment level of output in the long run; this represents a fairly conventional static output gain. But lower inflation also increases the rate of economic growth in the presence of constant returns to (broad) capital, as emphasized in the new endogenous growth literature (see, for instance, Easterly (1993)). This dynamic gain can be substantial in practice, as suggested by the simulations performed by Gylfason (1996). Thus, by lowering the level of inflation (and possibly the variability of inflation, as discussed below) and improving the allocation of resources, macroeconomic adjustment programs promote growth, thereby enhancing their long-term benefits to the poor.

3.2.4 Real Exchange Rate

The combination of exchange rate, fiscal, and monetary policies implemented in macroeconomic adjustment programs often aims at achieving a depreciation of the real exchange rate, in order to foster a reallocation of resources toward the tradables sector. In turn, a real depreciation may affect poverty (and income distribution) through two main channels:

- A real depreciation—brought about either through a nominal depreciation or a fall in the price of nontradable goods—favors consumers of nontradables (such as housing and retail services) in general, and the urban poor in particular. However, in practice, a real depreciation is often implemented through a nominal depreciation, which also raises the domestic price of imported goods. To the extent that such goods are consumed by the poor, there is a negative income effect which may offset, at least in part, the relative price effect.

- A real depreciation tends to foster a reallocation of resources toward agricultural export activities, raising the income of export-crop farmers and rural households (see Dorosh and Sahn (2000)).[16] In countries

[16]Results of household surveys in sub-Saharan Africa suggest that not only do the poor sell agricultural output, but that tradable products, both exports and food crops, constitute a significant share of their agricultural earnings (Sahn et al. (1997, p. 32)).

where the poor are predominantly in the rural areas, a real depreciation will therefore raise incomes and reduce poverty.

However, there are other offsetting supply-side effects of a real exchange rate depreciation that must also be taken into account. Because resources are reallocated toward the tradable sector, the demand for labor in the nontradable sector may fall; lower employment and nominal wages (in the presence of downward rigidity of prices) may translate into a fall in real wages and a higher incidence of poverty. In particular, if the urban poor are also producers of nontraded goods (as is the case in the informal sector), the economy-wide benefit of a reduction in rural poverty may be highly mitigated and aggregate poverty may well increase.

The real exchange rate depreciation that often accompanies macroeconomic adjustment programs (at least in their initial stages) may also bring about indirect effects on poverty. For instance, it has been noted that a real depreciation can lead to an increase in the user cost of capital in the tradable sector, because capital goods (machinery and equipment) are often imported in developing countries (Lora and Olivera (1998)). This tends to lower investment in fixed capital and, as a result of complementarity, to reduce the demand for skilled workers. To the extent that skilled and unskilled labor are net substitutes (as the evidence suggests for many countries), the demand for unskilled workers may increase, raising employment and average income of the poor, thereby reducing the incidence of poverty. However, to the extent that the real depreciation is accompanied (or brought about) by a trade liberalization program that features a sharp reduction in tariffs, one may get the exact opposite results: the user cost of imported capital goods may fall significantly—thereby leading to an increase in the demand for skilled labor, a fall in unskilled employment, and an increase in poverty.

3.2.5 Macroeconomic Volatility

A high degree of macroeconomic volatility is a well-documented feature of developing countries (see Agénor and Montiel (1999, Chapter 1)). Such volatility results very often from external factors (such as sharp changes in a country's terms of trade or fluctuations in world interest rates, due to abrupt changes in market sentiment) but is also sometimes policy-induced, in part as a result of the absence of rules-based policymaking and the propensity to adopt "stop-and-go" policies. Specifically, macroeconomic volatility can affect the poor through the following channels:

- Investment and growth. Volatility tends to distort price signals and the expected rate of return for investors; in the presence of irreversibility effects (see Dixit and Pindyck (1994)), the decision to wait may lead to lower private investment and lower growth rates. Nonlinearities generated by capital market imperfections may also lead to significant effects of volatility on investment (Aizenman and Marion (1999)).

- Precautionary savings. The propensity to save for both rich and poor households may increase if macroeconomic volatility translates into higher income uncertainty or an increased probability of facing borrowing constraints in "bad times" (as in Agénor and Aizenman (2000)). However, higher savings may also increase resources available for financial intermediaries to lend to potential investors, thereby stimulating growth; the net effect on poverty is thus a priori ambiguous.

- Credit market effects. A higher degree of macroeconomic volatility may heighten the perceived risk of default by lenders and increase the incidence of credit rationing, or lead to a higher risk premium and borrowing rates for private firms (see Agénor and Aizenman (1998)). This may have an adverse effect on labor demand and the poor.

- Distributional effect. This effect may itself result from changes in inflation (see below).

Several studies have recently focused on the impact of macroeconomic volatility on growth. Bleaney (1996), for instance, in a cross-section study covering the period 1980-90, found that macroeconomic instability (particularly when measured by the fiscal balance and the degree of volatility of the real exchange rate) has a significant negative effect on the rate of economic growth and possibly also a negative effect on investment.[17] Rodrik (1998) obtained similar results for sub-Saharan Africa. Evidence for Latin America also suggests that macroeconomic volatility has tended to worsen income distribution and increase poverty in the region (Londoño and Székely (1997)).[18] Overall, therefore, the foregoing discussion suggests that macro-

[17] In contrast to some other studies inflation in Bleaney's regressions loses its significance when the indicator of real exchange rate variability is introduced.

[18] Londoño and Székely argued that this outcome may be explained in part by arguing that the poor are less well equipped to cope with economic shocks and that incomes of the poor are substantially more sensitive to changes in aggregate income than upper-income groups.

economic adjustment, to the extent that it results in greater macroeconomic stability, may well lead to higher growth rates and reduce the incidence of poverty.

3.2.6 Distributional Effects

As noted in the previous section, the impact of growth on poverty can be highly mitigated by changes in income distribution. In general, large differences may exist between countries in the extent to which even a distribution-neutral growth process will affect poverty. The gains to the poor from such growth will tend to be lower the higher the extent of initial inequality; under distribution-neutrality, a smaller share of total income must imply a smaller absolute gain from a given increase in total income. The evidence reviewed by Bruno, Ravallion, and Squire (1998) suggests that growth is not always distribution neutral and that changes in distribution can indeed have a large impact on poverty. They estimate that, holding mean income constant, a 1 percentage point increase in the Gini index is typically associated with roughly a 4 percentage point increase in the proportion of the population living on less than $1 a day. There is also a growing analytical literature suggesting that initial distribution matters to the extent and nature of subsequent growth (see, for instance, Galor and Zeira (1993)). This link can operate through credit market constraints, which limit the ability of the poor to invest in acquiring skills.

Another channel through which inequality may affect growth is through changes in macroeconomic volatility. Ramey and Ramey (1995)) found that greater volatility of the growth rate tends to reduce the average rate of growth—an effect that may in part be due to its deterring effect on physical and human capital accumulation. More recently, Breen and Garcia-Penalosa (1999), using a cross-section of 80 developed and developing countries, found that income inequality is positively correlated with aggregate volatility, measured by the standard deviation of the annual growth rate of output.

Several explanations have been put forward to account for the adverse impact that inequality may have on macroeconomic volatility and ultimately on growth. Alesina and Perotti (1996) argued that high inequality may lead to political instability, which may in turn results in high macroeconomic volatility and lower growth. Aghion, Caroli and Garcia-Penalosa (1999, pp. 1628-30), by contrast, argued that there is a direct effect of inequality on macroeconomic fluctuations. Inequality in (initial) resources leads to inequal-

ity in access to investment opportunities across individuals in the presence of capital market imperfections—as a result, for instance, of collateral effects. This can generate persistent and large cyclical fluctuations in credit and investment (as individuals increase borrowing during booms and reduce it during recessions) that are detrimental to growth because of unexploited possibilities to invest in high-yield projects.

An important question is, then, what accounts for changes in income distribution? Figure 4 displays the correlation between the Gini coefficient and real GDP per capita for the sample of developed and developing countries included in the study of Dollar and Kraay (2001). The figure suggests a "clustering" pattern—higher-income developed countries, in general, tend to have lower inequality than developing countries. At the same time, within the group of developing countries, the relationship appears to be positive—a relationship that is consistent with the view that higher inequality is conducive to a higher aggregate propensity to save, higher rates of capital accumulation, and higher growth rates. However, recent formal econometric studies (such as Barro (2000)) have been unable to find a robust relation between per capita income and inequality. In particular, the hypothesis of a Kuznets curve, an inverted U-shape between income levels and inequality, appears to be fragile (see also Fishlow (1995)). There is stronger evidence that changes in income inequality are related to investment in human capital—and thus to borrowing constraints, as noted earlier. As argued by Londoño and Székely(1997, *2000*), particular, the worsening in income inequality observed in Latin America in recent years appears to have been the result of growing inequalities in educational opportunities and inadequate access to credit markets.

High and variable inflation may also explain large changes in the distribution of income and wealth; such effects may be of considerable importance in evaluating the costs and benefits of macroeconomic adjustment programs. In general, changes in income distribution are the result of two categories of factors: the allocation of assets (both real and financial) and their relative rates of return. Inflation affects income distribution through both channels. First, it affects the relative values of different assets and liabilities. Unanticipated inflation, in particular, by lowering the real value of both nominal assets and liabilities, favors debtors and holders of real equity over lenders and owners of nominal assets. In the absence of indexation, it also affects negatively suppliers of labor locked in long-term employment contracts. The net distributional effects will depend on access to hedging instruments (most

notably the degree of contractual indexation), the incidence and length of contracts, and the distribution of nominal assets and liabilities across income groups. In developing countries with a relatively unsophisticated financial system, lower-income groups rarely hold significant nominal liabilities (such as mortgages), in contrast to middle-income groups. As a result, the poor may suffer from inflation through an erosion of their nominal assets (as noted earlier), whereas the middle class may benefit from an erosion of its nominal liabilities.

Second, inflation affects income distribution by altering relative returns on assets. If indexed assets and foreign-currency denominated assets are held principally by upper-income groups, whereas lower-income groups hold mainly domestic cash, then inflation, even if expected, will increase inequality, because the inflation tax (as noted earlier) will be borne by the poorer segments of society. Third, high inflation may also affect income distribution indirectly by lowering output and employment through a variety of channels, including distortions in relative price signals and their effects on allocative efficiency, as discussed earlier.

The foregoing discussion suggests that, in principle inflation may either increase or reduce distributional inequalities. Indeed, Figure 5, which displays the correlation between inequality (as measured by the Gini index) and inflation for the group of developed and developing countries included in the data compiled by Dollar and Kraay (2001), does not show any obvious association between the two variables—beyond the clustering pattern observed in Figure 4. However, several formal empirical studies found that inflation tends indeed to increase inequality. Bulir (2001), in particular, found that the adverse effect of inflation on income distribution is highly significant at high inflation levels. Overall, thus, macroeconomic adjustment, by lowering mean inflation and its variability, may have a very significant effect on poverty, by reducing income inequality.

3.3 Asymmetric Effects of Cycles and Crises

A growing body of empirical evidence suggests that cyclical downturns and economic crises may have an asymmetric effect on poverty: recessions or sharp output contractions may increase poverty rates significantly, whereas expansions tend to have a more limited effect. To the extent that the austerity measures that are often at the core of macroeconomic adjustment programs lead to adverse, short-run movements in output, asymmetric effects

may mitigate significantly the longer-run benefits of adjustment for the poor. It is thus important to understand the sources of asymmetry. Following Agénor (2001), five main classes of explanations can be distinguished. The first dwells on parents' decisions regarding their children attending school; the second is based on asymmetric changes in expectations and confidence factors; the third on a "credit crunch" at the firm level, with rationing induced by either adverse selection problems or negative shocks to net worth; the fourth emphasizes the impact of borrowing constraints on household consumption behavior; and the fifth dwells on "labor hoarding" by firms facing high turnover costs.

3.3.1 Schooling Effects

A fall in real income during an economic downturn may have an irreversible impact on the human capital of the poor. Lustig (2000), for instance, argued that children in poor families (particularly the very poor ones) are sometimes taken out of school and put to work in response to large adverse shocks—thereby mitigating the fall in the household's income—but they are not sent back to school when the "good times" roll again. To the extent that negative shocks to income affect adversely the ability of the poor to enhance their stock of human capital, they will also hinder their ability to escape from poverty. Thus, large recessions create some sort of "asymmetric hysteresis" effect on poverty, in the sense of temporary negative shocks having persistent effects. However, the evidence supporting this view is mixed; for instance, Neri and Thomas (2000) found that in Brazil, children are not more likely to drop out of school in recessions than during expansions. At the same time the evidence gathered by Gaviria (2001) for seven Latin American countries suggests it is the lower middle-class households (rather than the poor households) that are more likely to cut back on human capital investments in response to adverse income shocks.

3.3.2 Expectations and Confidence Factors

Consumers and firms may be more pessimistic during recessions than they are optimistic during expansions, and immediate prospects may matter more during downturns than future prospects. If consumers and firms worry more about the overall economic outlook and the economy's likely direction in a downturn, a positive output shock—induced by, say, a relaxation of credit

constraints—may have a smaller impact (and thus be less effective) on private spending decisions during recessions than during booms. In addition, if the perceived degree of uncertainty about future profitability rises during recessions, firms may be less willing to invest—even after a large (policy-induced) positive shock to aggregate demand. The reason, of course, is the "option value" associated with waiting for the uncertainty to dissipate (Dixit and Pindyck (1994)). If output and labor demand become less responsive to positive shocks during a recession, the initial increase in poverty induced by higher unemployment may be difficult to reverse.

3.3.3 Adverse Selection, Net Worth, and Credit

Recessions may be accompanied by high or increasing interest rates because an economic slowdown may raise the risk of bankruptcy. This may lead banks to raise the premium that they charge over and above the cost of funds, as shown for instance by Agénor and Aizenman (1998). An increase in the perceived risk of default may also lead to a tightening of credit constraints if lenders are unwilling to lend to riskier borrowers, as implied by adverse selection models of the credit market (see, for instance, Jaffee and Stiglitz (1990)). The tightening of credit constraints may magnify the impact of the initial recession on borrowing and spending, through both demand- and supply-side effects. The resulting fall in labor demand and thus the effect on poverty may also be compounded. If expansions are not characterized by an equivalent reduction in the perceived risk of default, adverse selection problems may impart an asymmetric bias to output shocks.[19]

A related argument that may explain a credit crunch in an economic downturn is based on net worth effects. A collapse in asset prices (e.g. real estate or equity prices) may lead to a sharp drop in the value of the collateral against which firms borrow. To the extent that firms (particularly small and medium-size ones) have limited alternatives to secure loans, banks may curtail credit because of the drop in value of assets that they can seize in case of default, possibly affecting smaller firms the most. A lower level of credit (or a higher risk premium) will, again, reduce output and employment, and eventually increase the incidence of poverty. An asymmetric effect may

[19] As discussed in detail by Agénor (2001), two factors may compound the incidence of a credit crunch induced by information problems: the degree of concentration in the financial system, and the fact that small and medium-size firms tend to be more dependent on bank credit than large firms.

result from the fact that, after the crisis, economic uncertainty may remain high, expectations may remain pessimistic at least for a while, entailing as a result a slow recovery in asset prices.

3.3.4 Borrowing Constraints and Household Consumption

Credit constraints operating at the household level may also represent a source of asymmetry in the response of poverty to output shocks. If such constraints become binding during recessions—as a result of adverse selection, or net worth effects, because household wealth may be also adversely affected by sharp drops in asset prices—they may hamper the ability of households to smooth consumption.[20] The available evidence suggests indeed that risk-sharing and consumption smoothing remain highly imperfect in developing countries. The poorest households are typically those least insured against shocks because of their inability to accumulate assets and because, as noted earlier, asymmetric information problems and high transaction costs may completely preclude access for them to private market insurance or credit mechanisms to smooth income fluctuations. As a result, consumption smoothing through borrowing and lending is simply not feasible. Poor households may then have no option but to engage in either sub-optimal labor allocation decisions (such as forcing children to quit school and work, as noted earlier), or to let consumption fluctuate as much as income—with possibly detrimental longer-run effects on productivity.

3.3.5 The "Labor Hoarding" Hypothesis

The argument is that recessions may worsen poverty because of an asymmetric effect on employment and productivity (see Agénor (1999, 2001*a*)). In a downturn, unskilled workers (among which the poor tend to be concentrated) are often the first to lose their jobs as firms "hoard" their skilled labor force because of the existence of high turnover costs (hiring, training and firing costs) associated with the use of that category of labor. The incentive to do so is higher the more transitory the shock is perceived to be.

[20] In principle, the possibility of binding borrowing constraints in adverse state of nature does not, by itself, result in an asymmetric effect. Households may "internalize" state-dependent credit constraints by deciding, in response to income risk, to accumulate more assets or engage in precautionary savings in "good" times in order to shelter consumption in "bad" times. Recent evidence on this type of *ex ante* risk-mitigating strategy is provided by Agénor and Aizenman (2000) for sub-Saharan Africa.

Firms are therefore off their (skilled) labor demand curve during recessions, and skilled workers' wages are higher than their marginal product. During expansions, the priority for firms is to recoup the productivity losses and foregone profit opportunities incurred during the downturn. If the greater degree of complementarity between skilled labor and physical capital is high, they therefore increase fixed investment and reduce their demand of unskilled labor. This, in turn, may produce a strong degree of persistence in unskilled unemployment and poverty in the early stages of an expansion.

3.4 The Role of the Labor Market

The thrust of the foregoing discussion is that there are a variety of channels—with possibly offsetting (direct and indirect) effects—through which macroeconomic adjustment affects poverty. The importance of each of these channels will in general depend on the institutional and structural characteristics of individual economies.

A key underlying theme of the discussion, however, is that the labor market is a crucial element in understanding poverty. The poor often generate a significant share of their income from labor services. The way the labor market operates conditions the employment and wage outcomes of adjustment programs. There are, of course, more general reasons than poverty itself for focusing on the role of the labor market in the process of macroeconomic adjustment. Whether or not a real devaluation leads to a reduction in the current account deficit, for instance, depends largely on the extent to which real wages are flexible downward. And labor market distortions may affect the productivity of all categories of workers, skilled and unskilled, thereby affecting the incomes of all types of households and the economy's overall growth rate. Nevertheless, because of their precarious condition, the poor are likely to be particularly affected by labor market imperfections that prevent an efficient allocation of resources.

As noted earlier, for studies focusing on the role of short-term macroeconomic factors on poverty in developing countries, understanding the dynamics of the urban labor market is crucial. In this respect there are a number of important institutional characteristics of this market that need to be considered.[21] In general, the urban labor market can be divided into a formal

[21]See Agénor (1996) for a detailed overview of the literature, and Bigsten and Horton (1998) for a survey of labor markets in sub-Saharan Africa. See also Horton, Kanbur,

segment (which includes, on the demand side, large private enterprises and the public sector) and an informal segment, which is characterized by ease of entry, a high degree of wage flexibility, and the absence of enforcement of labor regulations.[22] Because formal employment in many developing countries (in both Latin America and sub-Saharan Africa) has increased only slowly in recent decades, whereas urban migration has been extensive, informal urban employment has increased dramatically in size. In Kenya, for instance, the share of the informal sector in employment outside agriculture is currently about 60 percent. In Ghana, between 1980 and 1990, employment in the formal sector declined significantly, despite a substantial increase (by 50 percent) of the non-agricultural labor force. Estimates by Canagarapajah and Mazumdar (1997, p. 45) suggest that much of the expansion in the labor force was absorbed by the informal sector, whose size increased from 36 to 45 percent of the total (agricultural and non-agricultural) labor force. In Bangladesh, 90 percent of the labor force is in the informal (nontraded) sector, mainly in rural areas. In Latin America, informal sector employment accounted for 57.4 percent of total employment in 1996, nearly 6 percentage points more than in 1990. For the region as a whole, the expansion in the number of informal sector jobs during the same period accounted for 80 percent of the net increase in employment (Lora and Olivera, 1998, p. 10). Figure 6 suggests that the size of the urban informal sector tends to be inversely related with the level and rate of growth of GDP per capita. There is also some evidence that the size of the informal sector is related to the tax burden; Figure 7 suggests indeed that both the share of overall tax revenue in GDP and the share of direct taxes in GDP are inversely related with the share of urban informal sector employment.

Empirical studies indicate that workers in the formal sector typically have higher levels of education than informal sector workers. In part this is because formal sector firms use more advanced technologies, which require workers with higher levels of skills (and sometimes considerable on-the-job

and Mazumdar (1994) and the World Bank (1995). Marquez and Pagés-Serra (1998) review regulations governing hiring, firing, overtime work, social security contributions, minimum wages and collective bargaining in Latin America, and examines their impact on labor market outcomes. Edwards and Cox Edward (2000) discuss the case of Chile.

[22]The informal sector can be defined in various ways. A common definition is that it includes self-employed workers (except for professionals) unpaid family workers, workers employed in small firms (less than, say, 5 or 6 workers), and those working in the trade and services sector without a contract.

training) to be operated. Higher wages allow firms to reduce turnover costs for highly-skilled workers. A study of the manufacturing industry in Kenya, for instance, found a very significant effect of firm size on wages (Bigsten and Horton (2001)), even after controlling for (observable) labor quality differences and working conditions. In addition to reducing labor turnover, firms may be willing to pay more to enhance productivity, attract better workers, or maintain loyalty and morale, in line with various forms of efficiency wage theories (see Agénor (1996, 2000)). The evidence also suggests that the urban poor (who provide mostly unskilled labor) are disproportionately employed in the informal sector. In Chile, for instance, 30 percent of employment in the total population was informal in 1994; it was 45 percent amongst the poor (Anríquez, Cowan, and De Gregorio (1998)). Estimates for sub-Saharan Africa are much higher. Thus, "disguised" unemployment often characterizes the urban informal labor market. Other evidence indicates that open unemployment is also important in many developing countries, affecting both skilled and unskilled workers. This suggests that the extent of labor mobility between the formal and the informal sectors, although quite high, may not be perfect at least in the short run—thereby limiting the "shock-absorbing", or countercyclical, role of the informal sector. The next section presents a macroeconomic model with a labor market structure that captures several of the characteristics highlighted above, and analyzes the impact of fiscal adjustment on poverty.

4 Macroeconomic Policy, the Urban Labor Market, and Poverty

Dwelling on the above observations, this section presents a macroeconomic model of a small open developing economy that provides a useful framework for the analysis of the role of the labor market in the transmission of macroeconomic policies to the poor.[23] Three categories of agents are assumed to operate in the economy considered: firms, households, and the government.[24] The nominal exchange rate is fixed. The economy consists of two major segments: the formal economy and the informal sector. The capital stock in

[23]Demery and Addison (1994) provide a partial equilibrium analysis of the role of the labor market in the transmission process of expenditure-switching policies.

[24]The model could be extended, along the lines described in Agénor (1998), to introduce a trade union in the formal sector.

each production sector is fixed within the time frame of the analysis. The labor force is also fixed and consists of skilled and unskilled workers.

4.1 Basic Structure

4.1.1 The Formal Sector

Production in the formal economy consists of an exportable good and requires both types of labor. For simplicity, total output of exportables is assumed to be sold abroad.[25] The price of exportables is fixed on world markets; the demand for exportables is infinitely elastic at that price, and output is supply-determined. Setting the world price of exportables to unity implies that the domestic price of exports is equal to the nominal exchange rate, E.

Let Y_X denote the production of exportables, n_S and n_U employment levels of skilled and unskilled labor (measured in natural units) in that sector, and e the level of effort provided by a typical skilled worker.[26] Assuming a Cobb-Douglas production technology yields[27]

$$Y_X = (en_S)^{\alpha} n_U^{1-\alpha}, \quad 0 < \alpha < 1. \tag{1}$$

Generalizing the specification developed by Agénor and Aizenman (1999), the effort function is defined as

$$e = 1 - \Lambda(\frac{\Omega}{\omega_S^c})^{\gamma}, \quad 0 < \Lambda < 1, \ \gamma \geq 0, \tag{2}$$

where ω_S^c denotes the *consumption wage* for skilled workers in the exportables sector, and Ω the worker's reservation wage. Equation (2) indicates that an increase in skilled workers' consumption wage relative to their reservation wage raises the level of effort. Effort is also concave in ω_S^c. If effort is independent of relative wages ($\gamma = 0$), or if the consumption wage is equal to the reservation wage, $e = 1 - \Lambda$.[28]

[25] The model can be extented to account for the existence of a sector producing importables, but at the cost of greater complexity.

[26] The level of effort provided by an unskilled worker is constant and normalized to unity for simplicity.

[27] Note that the assumed technology implies that skilled and unskilled labor are Edgeworth complements.

[28] An alternative way to introduce efficiency considerations in the formal sector would be to assume that production requires (as noted earlier) skilled labor to operate physical

Whereas skilled workers determine the level of effort on the basis of the consumption wage that they face, producers set instead the *product wage*, ω_S. Suppose that the consumer price index is a weighted, geometric average of the price of imported goods, E—assuming that the foreign-currency price of these goods is normalized to unity—and the price of nontradables, P_N:

$$P = E^{1-\delta} P_N^{\delta}, \quad 0 < \delta < 1, \tag{3}$$

where δ measures the share of home goods in total expenditure.

Let $z = E/P_N$ denote the relative price of imports in terms of nontradables; z will be referred to in what follows as the real exchange rate. By definition, therefore, $P = z^{-\delta} E$, so that

$$\omega_S^c = z^{\delta} \omega_S. \tag{4}$$

A binding minimum wage for unskilled workers is in place in the formal economy. For a given level of the minimum wage, firms in the formal sector determine employment levels and the product wage earned by skilled workers so as to maximize profits and minimize the cost of skilled labor in efficiency units. Formally, let ω_m be the real minimum wage (measured in terms of the price of exportables) earned by unskilled workers in the formal sector. Assuming that firms incur no hiring or firing costs, the decision problem is thus

$$\max_{n_S, n_U, \omega_S} \Pi_X = \left\{ [1 - \Lambda(\frac{\Omega}{z^{\delta} \omega_S})^{\gamma}] n_S \right\}^{\alpha} n_U^{1-\alpha} - \omega_S n_S - \omega_m n_U,$$

with z and ω_m taken as given.

The first-order conditions for this optimization problem are:

$$\alpha(\frac{n_U}{e n_S})^{1-\alpha} [1 - \Lambda(\frac{\Omega}{z^{\delta} \omega_S})^{\gamma}] = \omega_S, \tag{5}$$

$$(1 - \alpha)(\frac{n_U}{e n_S})^{-\alpha} = \omega_m, \tag{6}$$

capital. Firms would then set wages to minimize turnover costs. Assuming that the quit rate is a function of the consumption wage would yield results that are qualitatively similar to those described below (see Agénor, 2001*b*).

$$\alpha(\frac{n_U}{en_S})^{1-\alpha}n_S(\frac{\partial e}{\partial \omega_S}) = \alpha\gamma\Lambda(\frac{n_U}{en_S})^{1-\alpha}(\frac{n_S}{\omega_S})(\frac{\Omega}{z^\delta\omega_S})^\gamma = n_S. \tag{7}$$

The first two conditions equate the real net marginal product of each category of labor to the relevant real wage. The third determines skilled workers' wage so as to ensure that the level of effort is optimal. It can be re-written as

$$\alpha\gamma\Lambda(\frac{n_U}{en_S})^{1-\alpha}(\frac{\Omega}{z^\delta\omega_S})^\gamma = \omega_S,$$

which can be equated with condition (5) to give

$$(1+\gamma)\Lambda(\frac{\Omega}{z^\delta\omega_S})^\gamma = 1,$$

so that

$$\omega_S = \frac{[(1+\gamma)\Lambda]^{1/\gamma}\Omega}{z^\delta} = \theta(z,\Omega), \quad \theta_z < 0,\ \theta_\Omega > 0. \tag{8}$$

Equation (8) indicates that the efficiency wage for skilled workers is negatively related to the real exchange rate and positively to the opportunity cost of effort. For a given level of the product wage, a depreciation of the real exchange rate (resulting from a fall in the price of nontradables) increases the consumption wage and thus tends to raise the level of effort—allowing firms to reduce the equilibrium product wage.

The demand functions for labor can be derived from the above equations as:

$$n_S^d = n_S^d(\bar{\omega_S};\bar{\omega_m}), \quad n_U^d = n_U^d(\bar{\omega_S};\bar{\omega_m}). \tag{9}$$

These equations indicate that an increase in the product wage for either category of labor reduces the demand for both of them, as a result of gross complementarity.

Substituting these results in equation (1) and using (8) yields the supply function of exportables:

$$Y_X^s = Y_X^s(\bar{\omega_S};\bar{\omega_m}) = Y_X^s(\overset{+}{z};\bar{\omega_m}). \tag{10}$$

4.1.2 The Informal Economy

Firms in the informal economy produce a nontraded good, which requires only unskilled labor and is used only for final consumption. The price of this good is flexible, and adjusts to equilibrate supply and demand.

Technology for the production of the nontraded good in the informal sector is characterized by decreasing returns to labor:

$$Y_N = n_N^{\eta}, \quad 0 < \eta < 1, \tag{11}$$

where Y_N denotes output of home goods, and n_N the quantity of labor employed in the informal economy. Producers maximize profits given by $z^{-1}Y_N - \omega_N n_N$, where $\omega_N < \omega_m$ denotes the real wage in the informal sector, measured in terms of the price of exportables.[29] Profit maximization yields the familiar equality between marginal revenue and marginal cost, $\omega_N = Y_N'/z$, from which labor demand can be derived as

$$n_N^d = (\frac{\omega_N z}{\eta})^{1/(\eta-1)}, \quad n_N^{d\prime} < 0, \tag{12}$$

where $\omega_N z$ measures the product wage in the informal sector. Substituting equation (12) in (11) yields the supply function for goods produced in the informal sector:

$$Y_N^s = (\frac{\omega_N z}{\eta})^{\eta/(\eta-1)}, \quad Y_N^{s\prime} < 0. \tag{13}$$

4.1.3 Households

There are two categories of households in the economy: an "upper-income" household, which consists of all workers (skilled and unskilled) employed in the formal economy, and a "low-income" household, which consists of all workers employed in the informal sector.[30] The key difference between upper- and low-income households is that the former group saves a fraction

[29]The condition that the minimum wage be higher than the informal sector is necessary to prevent a corner solution in which unskilled workers have no incentive to seek employment in the formal sector.

[30]An alternative approach (at this level of sbstraction) would be to assume that all unskilled workers, in both the formal and informal sectors, are poor. As noted earlier, the empirical evidence suggests indeed that the average number of years of schooling of the poor tends typically to be lower than that of the total workforce.

of its current disposable resources and accumulates wealth in the form of a tradable interest-bearing bond, whereas the latter group (which pays no income taxes) spends all of its income. Both categories of households supply labor inelastically and consume, in addition to the nontraded good produced in the informal sector, an imported good which is imperfectly substitutable for the home good.

Consider first the upper-income household. Its income consists of total output of exportables, Y_X^s, and interest income on holdings of traded bonds, i^*B^*, where i^* is the world interest rate (assumed constant) and B^* the foreign-currency value of these holdings.[31] Total consumption expenditure, c_R, depends positively on both disposable income and current wealth:[32]

$$c_R = \alpha(Y_X^s + i^*B^* - T) + \upsilon B^*, \quad 0 < \alpha < 1, \ \upsilon > 0, \tag{14}$$

where T denotes lump-sum taxes (measured in terms of the price of exportables) paid by the upper-income household. The last term in this expression, υB^*, captures a wealth effect.

If all savings is invested in interest-bearing assets, the flow of savings or the stock of foreign bonds held by the upper-income household evolves over time according to

$$\dot{B}^* = Y_X^s + i^*B^* - T - c_R,$$

that is, using (14):

$$\dot{B}^* = (1-\alpha)(Y_X^s + i^*B^* - T) - \upsilon B^*. \tag{15}$$

The upper-income household consumes imported goods (in quantity c_R^I) as well as home goods (in quantity c_R^N). Assuming a Cobb-Douglas sub-utility function, the allocation of total consumption expenditure among these goods is given by

$$c_R^I = (1-\delta)c_R, \ \ c_R^N = \delta z c_R, \tag{16}$$

[31] More generally, it could be assumed that the upper-income household holds, in addition to foreign bonds, domestic assets (such as land). To avoid complicating the analysis further, domestic sources of wealth accumulation are ignored in what follows.

[32] Life-cycle models would predict a relationship between lifetime wealth and consumption, rather than income and current wealth. However, in the presence of liquidity constraints current income would also affects expenditure. See the evidence for developing countries discussed by Khayum and Baffoe-Bonnie (1994) and Veidyanathan (1993), or the literature review in Agénor (2000, Chapter 1) and Agénor and Montiel (1999, Chapter 3).

where δ, as indicated earlier, measures the share of home goods in expenditure.

Resources of the low-income household (measured in terms of exportables) consist of income generated in the informal economy, $z^{-1}Y_N^s$. All income is spent on consumption, c_P:

$$c_P = z^{-1}Y_N^s. \tag{17}$$

Assuming for simplicity an allocation rule across consumption goods that is similar to the upper-income household's yields

$$c_P^I = (1-\delta)c_P, \quad c_P^N = \delta z c_P. \tag{18}$$

4.1.4 The Market for Informal Sector Goods

The equilibrium condition of the market for informal sector goods can be written as:

$$Y_N^s = c_R^N + c_P^N.$$

Using equations (13), (16) and (18), this condition becomes

$$Y_N^s(\omega_N z) = \delta z(c_R + c_P),$$

which can be re-written as, using (17):

$$Y_N^s(\omega_N z) = \frac{\delta}{1-\delta} z c_R. \tag{19}$$

4.1.5 The Informal Labor Market

The demand for labor in the informal sector is derived from profit maximization and is given by equation (12). Determining the supply of labor involves two steps. First, in line with the "luxury unemployment" hypothesis, skilled workers who are unable to obtain a job in the formal sector are assumed to prefer to remain unemployed rather than seek employment in the informal economy.[33] Second, the supply of unskilled workers in the formal sector, n_U^s,

[33]Evidence supporting this hypothesis is provided by Hirata and Humphrey (1991) for Brazil, Horton et al. (1994), and Banerjee and Bucci (1995) for India. Agénor (1996) provides a review of the evidence on skilled unemployment in developing countries. In general, of course, whether skilled workers who are not successful in applying for a job in the formal sector decide to seek employment in the informal economy depends on factors such as the efficiency of on-the-job search activities, demotivation effects, and the degree of support from relatives.

is assumed to change gradually over time as a function of wage differentials across sectors. Wage and employment prospects are formed on the basis of prevailing conditions in the labor market. Thus, denoting by n_U^p the constant number of unskilled workers in the labor force, the supply of labor in the informal sector, $n_U^p - n_U^s$, is also given at any point in time. The equilibrium condition of the labor market in the informal economy can consequently be written as

$$n_U^p - n_U^s = n_N^d(\omega_N z). \tag{20}$$

With wages in the informal sector adjusting continuously to equilibrate supply and demand for labor, this equation yields:[34]

$$\omega_N = \omega_N(\bar{z}, \overset{+}{n_U^s}), \quad \partial\omega_N/\partial z = -1, \tag{21}$$

which indicates that a depreciation of the real exchange rate has a negative and offsetting effect on the market-clearing wage. The reason is that, with labor supply constant, labor demand cannot change—which in turn requires the product wage to remain constant. An increase in the number of workers seeking employment in the formal economy has a positive effect on the market-clearing wage.[35]

Migration flows are determined by expected income opportunities, along the lines of Harris and Todaro (1970).[36] The expected wage in the formal economy is equal to the minimum wage weighted by the probability of being hired in the exportables sector. Assuming that hiring in that sector is

[34]In what follows, all derivatives are evaluated at initial values of wages and the real exchange rate equal to unity.

[35]Using (21), the equilibrium condition of the market for informal sector goods can be rewritten as, using (13):

$$(1-\delta)\left\{\frac{\omega_N(z, n_U^s)z}{\eta}\right\}^{\eta/(\eta-1)} = \delta z\left\{\alpha[Y_X^s(z;\omega_m) + i^*B^* - T] + \upsilon B^*\right\},$$

which can be solved for z as a function of n_U^s and B^*, as well as the exogenous variables ω_m, i^*, and B^*.

[36]See Bhattacharya (1993) for a review of the literature on the Harris-Todaro model and, for a more critical view, Stark (1991). Note that in the present setup the Harris-Todaro framework is used to explain migration flows between the (urban) informal sector and the (urban) formal sector, rather than migration between the rural and the urban sectors.

random, this probability can be approximated by the ratio of currently employed workers to those seeking employment, n_U^d/n_U^s. The expected wage in the informal economy is simply the going wage, because there are no barriers to entry in that sector. Thus, the supply of unskilled workers in the formal sector evolves over time according to

$$\dot{n}_U^s = \beta \left\{ \frac{\omega_m n_U^d}{n_U^s} - \omega_N \right\}, \quad \beta > 0, \tag{22}$$

where β denotes the speed of adjustment. Implicit in the above formulation is the assumption that workers employed in the informal sector do not engage in on-the-job search. As suggested by Agénor (1999), this assumption can be motivated by the existence of informational inefficiencies. The labor market in many developing countries is characterized by the absence of institutions capable of processing and providing in a timely manner relevant information on job opportunities to potential applicants—particularly those will low levels of qualifications. As a result, job search for unskilled workers in the formal sector often requires, literally speaking, waiting for employment offers at factory gates.

4.1.6 Government

The government consumes only imported goods and finances its expenditure through lump-sum taxes on skilled workers:[37]

$$T = g_I, \tag{23}$$

where g_I denotes the foreign-currency value of government imports.

4.2 Long-Run Equilibrium

The dynamic structure of the model is derived in Appendix A. As shown there, the dynamics of the model can be formulated in terms of the size of the unskilled labor force seeking employment in the formal economy, n_U^s, and the upper-income household's holdings of traded bonds, B^*. A key feature of the model is that, as implied by equation (22), in the long run the unskilled

[37] In practice, a large proportion of government spending consists of outlays on nontraded goods and services. This cannot be accounted for in the present setting, because there is only one home good, produced in the informal sector.

wage ratio—the ratio of wages earned by unskilled workers in the formal and informal sectors—must be equal to the inverse of the employment ratio in the formal economy:

$$\omega_m/\tilde{\omega}_N = \tilde{n}_U^s/\tilde{n}_U^d. \tag{24}$$

This equation indicates that, as long as the minimum wage exceeds the informal sector wage (as is the case here), unskilled unemployment will emerge in equilibrium. As shown in Appendix A, in addition to condition (24), in the steady state the current account must be in equilibrium. From the steady-state solutions of B and n_U^s, the equilibrium values of the "short-run" variables, the real exchange rate and the real wage in the informal economy, can be derived.

The steady-state equilibrium of the model is depicted in Figure 8. The locus BB gives the combinations of B^* and n_U^s for which bond holdings remain constant, whereas the locus LL depicts the combinations of B^* and n_U^s for which the size of the unskilled labor force seeking employment in the formal sector does not change over time. Stability (as discussed in Appendix A) requires LL to be steeper than BB. The steady-state equilibrium obtains at point E. If the economy's initial position is at, say, point A—characterized by a negative differential between the expected wage in the formal and the informal sectors, and a current account deficit—the transition toward the steady state will be characterized by a fall in the size of the unskilled labor force seeking employment in the formal sector and a gradual reduction in holdings of foreign bonds. Beyond point A' (located on LL), the expected income differential turns positive, because the continuous inflow of workers in the informal sector that occurs during the first phase of adjustment puts downward pressure on wages there. The supply of unskilled labor to the formal economy begins to increase. Holdings of foreign assets continue to decline, however, until the steady-state position is reached at E.

A graphical illustration of the partial, long-run equilibrium of the labor market, adapted from Agénor (1999), is presented in Figure 9. Panel A depicts the demand functions for labor in the formal sector. The demand curve for skilled labor, n_S^d, is downward-sloping, because it is negatively related to ω_S, the wage earned by skilled workers. Skilled unemployment is given in Panel A by the distance between the fixed supply of skilled labor, n_S^p, and the equilibrium point on the demand curve (point G). The demand curve for unskilled labor, n_U^d, is also downward-sloping because skilled and

unskilled workers are gross complements. Curve HH in Panel B depicts the relationship between the (long-run) supply of unskilled workers in the formal sector, n_U^s, given by equation (24), and employment of unskilled workers in the formal economy, n_U^d. It is derived by using the market-clearing condition (21)—taking z as given—to eliminate ω_N in (24). HH has a positive slope that is greater than unity, as implied by the assumption that $\omega_m > \omega_N$. The difference between point B (located on the 45-degree line) and B' (located on HH) gives unskilled unemployment. Curve VV is given by $n_U^p - n_U^s$; it is thus a linear transformation of HH. It determines the supply of labor (and thus actual employment) in the informal economy (point B''). Given the labor demand curve in the informal sector, n_N^d, the market-clearing wage is determined at point C in Panel C. The positive relationship between the skilled workers' wage and the informal sector wage—obtained by combining (8), (21), and (24)—is displayed as curve WW in Panel D. Thus, unemployment of both categories of labor—"quasi-voluntary" unemployment of skilled workers and "wait" unemployment of unskilled workers—prevails in equilibrium.[38]

4.3 Fiscal Adjustment, Employment, and the Poor

The model developed in the previous section can be used to analyze the labor market and poverty effects of a variety of macroeconomic policy shocks that have often been part of macroeconomic adjustment programs implemented in developing countries. For illustrative purposes, this paper limits itself to an analysis of the impact and steady-state effects of an increase in lump-sum taxes. This experiment also helps to illustrate the fact that fiscal austerity is not necessarily detrimental to the poor (even in the short run), once general equilibrium effects are properly accounted for.

4.3.1 Steady-State Effects

As shown in Figure 10, a rise in lump-sum taxes T leads in the long run to a reduction in the stock of foreign bonds held by the upper-income households and an increase in the supply of unskilled labor in the formal sector. The new equilibrium is at E', located at the intersection of the new curves $B'B'$ and

[38]Because there is no unemployment benefit scheme in the present framework, unemployed workers in the long run are implicitly assumed to either turn to a subsistence activity (home production) or to rely on relatives for their survival.

$L'L'$. Intuitively, the rise in T has two effects. The first is that it dampens consumption of informal sector goods by the upper-income household. At the initial level of supply of these goods (that is, at the initial values of the real exchange rate and the product wage in that sector), the real exchange rate must depreciate. The second effect results from the fact that an increase in taxes also lowers private spending on imports, whereas the real exchange rate depreciation stimulates exports. Both effects tend to raise the flow of savings of the upper-income household. But the flow of savings must be zero in the long-run equilibrium, implying that interest receipts on foreign bonds must fall. And because the world interest rate does not change, this can happen only through a reduction in the stock of foreign bonds held by the rich.

The depreciation of the real exchange rate lowers skilled workers' efficiency wage in the formal sector, thereby raising the demand for both categories of labor. The increase in labor demand raises the probability of employment in the formal economy and thus expected income there. This tends to increase the supply of unskilled labor in the formal economy.[39] Because the demand for skilled labor rises, the long-run effect of the shock is a reduction in the unemployment rate of skilled workers. Whether unemployment of unskilled workers rises or falls would seem to be a priori ambiguous; both the supply of, and the demand for, unskilled labor rise in the formal economy. As shown in Appendix A, however, it can be established that demand rises by more than supply in relative terms; the net outcome is thus a reduction in the *rate* of unemployment of unskilled labor in the urban formal sector. The fall in labor supply in the informal sector puts upward pressure on the market-clearing wage $\tilde{\omega}_N$—thereby outweighing the negative effect of the real depreciation.[40] The product wage there ($\tilde{\omega}_N \tilde{z}$) unambiguously rises, which brings about the required reduction in labor demand. Thus, informal sector wages move in the same direction as output in the formal economy, whereas

[39]Note that the initial, direct effect of the real appreciation is to increase the real wage (measured in terms of exportables) by the same amount, leaving the product wage in the informal sector constant. But the increase in the supply of labor in the informal sector (which results from the reduction in job seekers in the formal economy) exerts an aditional effect which lowers ω_N—and thus stimulates the supply of informal sector goods, thereby reinforcing the effects of the initial real appreciation.

[40]As indicated in (21), for a given level of n_U^s, ω_N must exactly offset movements in z. However, ω_N depends also on n_U^s; the rise in n_U^s puts upward pressure on informal sector wages.

output and employment in that sector move in the opposite direction.

4.3.2 Transitional Dynamics

The transitional dynamics associated with the increase in taxes are also illustrated in Figure 10. The impact effects operate in the same direction as the long-run effects described earlier: a reduction in consumption of domestic and imported goods by the upper-income household, a real depreciation, a fall in skilled workers' wages, and an increase in the demand for both categories of workers. The rise in labor demand raies the probability of employment (and thus expected income) in the formal economy. The effect of the real depreciation on the product wage in the informal economy is now completely offset by a *reduction* in the real wage there; as a result, the differential between expected wages in the formal and informal sectors unambiguously rises—therefore raising on impact the flow of labor in the formal economy ($\dot{n}_U^s(0) > 0$). The reason why impact movements in z and ω_N exactly offset each other is that n_U^s cannot change on impact. As a result, the product wage in the informal sector, $z\omega_N$, cannot change either, as can be inferred from equation (20). Thus, output and employment in the informal sector remain also constant on impact.

Although output of exportables rises as a result of the fall in skilled workers' wage, the net effect of the increase in taxes is a reduction in income and savings by the upper-income household, and thus a decumulation in holdings of foreign bonds ($\dot{B}_0^* < 0$). Over time, the adjustment process leads the economy monotonically from point E to point E', where the flow of savings is again zero and expected wages between the formal and informal sectors are equal.

What happens to poverty rates during the adjustment process? Suppose that the legal minimum wage is used as the official poverty line, and that average income in the informal sector, Y_N^s/n_N^d, is less than ω_m at all times (given (11) and (12), this implies that $(\omega_N z/\eta)^\eta < \omega_m$). Suppose also that the unemployed earn an (imputed) income from own production that is less than ω_m. The headcount index measure of poverty, I_H, is thus defined as the number of workers employed in the informal sector, plus unemployed workers in the formal economy (skilled and unskilled), divided by the size of the labor force, n:

$$I_H = \frac{1}{n}\left\{n_N^d + (n_S^p - n_S^d) + (n_U^s - n_U^d)\right\},$$

or equivalently, given that $n = n_S^p + n_U^s + n_N^d$:

$$I_H = 1 - (\frac{n_S^d + n_U^d}{n}).$$

On impact, as indicated earlier, the supply of unskilled labor in the formal economy remains constant, and employment in the informal sector does not change, because the product wage there remains constant. Thus, poverty falls as a result of the increase in the demand for both skilled and unskilled labor in the exportables sector. This is also the case in the long run. The analysis therefore helps to illustrate an important point that was alluded to earlier in less formal terms: fiscal austerity does not necessarily have an adverse effect on the poor, neither in the short or the long run. The reason is that the poverty effects of macroeconomic policies in a typical developing-country context operate through complex channels involving changes in aggregate demand and supply in the formal and informal sectors, as well as changes in relative prices and wages. Once these general equilibrium effects are accounted for, as was done here, macroeconomic adjustment may well benefit the poor by stimulating employment, and despite downward pressure on wages.

5 Empirical Evidence

The thrust of the foregoing discussion is that it is usually difficult to draw clear-cut theoretical conclusions regarding the effect of macroeconomic variables on poverty as a result of conflicting effects, both in the short and the long run. Empirical studies are thus important to assess whether net effects are positive or negative. Somewhat surprisingly, however, empirical analysis in this area has been limited. This section begins by reviewing some recent studies. It then presents some new econometric results for a cross-section of countries.

5.1 Factual, Econometric, and Simulation Studies

Existing studies analyzing the effect of macroeconomic factors on poverty consist of three main types: factual, econometric, and macro-simulation studies. Some of the factual studies focusing on Latin America have suggested, for

instance, that the poverty impact of expenditure policies adopted in the context of stabilization (and structural adjustment) programs during the 1980s has often been negative.[41] Another factual study that attempts to assess the effect of macroeconomic adjustment on poverty in sub-Saharan Africa is by Demery and Squire (1996). They use the macroeconomic policy index developed by the World Bank (1994) to do so.[42] They show that improvements in macroeconomic management (as captured by changes in the policy index) are associated with a decline in the incidence of poverty. More specifically, Demery and Squire find that for the six African countries that they consider—Côte d'Ivoire, Ethiopia, Ghana, Kenya, Nigeria, and Tanzania—poverty fell in countries that improved their macroeconomic policy regime and deteriorated in the one case (Côte d'Ivoire) in which it did not.[43] Depreciation of the real exchange rate was a key factor in the macroeconomic adjustment process; it also affected favorably rural incomes, benefitting the poor both directly and indirectly.

A key problem that factual empirical studies aimed at assessing the link between macroeconomic adjustment programs and poverty face is that they often forget the need for a "counterfactual" analysis. Too often the process of adjustment is blamed for the increase in poverty, without considering what would have happened in the absence of adjustment.

Among the econometric studies, Cardoso et al. (1995) and Amadeo and Neri (1997) have found that inflation and unemployment have an adverse effect on poverty in Brazil. Amadeo and Neri (1997), in particular, found that although inflation implies lower per capita income for all deciles of the distribution of income in Brazil, its effect on per capita earnings is lower for

[41] See Cardoso (1992) and Morley (1995). Cardoso, for instance, argued that stabilization worsened poverty in Brazil because fiscal adjustment led to a reduction in social expenditures. The issue, however, is quite complex, as discussed earlier.

[42] The index combines fiscal, monetary, and exchange rate policies. The fiscal component of the index, for instance, is based on the overall fiscal balance and total revenue. Scores are applied to performance in each of these areas and then added to arrive at the fiscal component of the index. A similar procedure is followed for the exchange rate and monetary components. The aggregate index is a weighted average of performance in each of these three areas of macroeconomic management, with weights given by the relative importance of each component in determining growth, as captured through cross-country regressions.

[43] The evidence is based on household sample surveys covering the 1980s and 1990s. As discussed in the first part of this paper, poverty in these countries is predominantly rural, with much of it occurring among small-scale farmers and among the self-employed.

the upper-income households. Put differently, inflation has a larger effect on earnings of the poor than on average per capita income. The use of time-series data in a single-country context is an important avenue of future research in the analysis of the role of macroeconomic factors and other determinants of poverty rates. Romer and Romer (1998), for instance, used time-series technique to investigate the impact of monetary policy on poverty in both the short run and the long run and found that these run effects go in opposite directions. The evidence for the United States shows that a cyclical boom (and lower unemployment) created by expansionary monetary policy is associated with improved conditions for the poor in the short run. Their cross-section evidence from a large sample of countries, however, shows that low inflation and stable aggregate demand growth are associated with lower poverty in the long run. Both the short- and long-run relationships are quantitatively large, statistically significant, and robust. But because the cyclical effects of monetary policy are inherently temporary, they concluded that monetary policy that aims at low inflation and stable aggregate demand is the most likely to permanently improve conditions for the poor. Agénor (2001) used a vector autoregression approach to analyze the extent to which output shocks have an asymmetric effect on the poor in Brazil, while simultaneously controlling for changes in the minimum wage and unemployment. This type of studies should be further developed to include (vector) error-correction models, so as to distinguish between long-run factors (such as the degree of inequality, and public expenditure on education and health) and short-term macroeconomic factors.

Some other studies have used simulation techniques to examine the effect of macroeconomic policy shocks on poverty. In particular, several recent papers focusing on sub-Saharan Africa have used computable general equilibrium (CGE) models for this purpose. Subramanian (1996), for instance, evaluates the impact of government policies (as well as external shocks) on poverty in Cameroon. Sarris (1996) examined the effects of various macroeconomic policy shocks (a 20 percent devaluation, an increase in public investment spending financed by a corresponding reduction in public current expenditure, and a reduction in public sector employment) in a CGE model for Tanzania. All shocks in his study result in short-term declines in real income for rich and poor alike. However, losses for the non-poor are significantly higher than the losses incurred by the poor (rural and urban), reflecting the losses in implicit rents. In the longer term, with output growth rates increasing and inflation falling, income gains are significant for both the

poor and middle-income households. Other studies include Bourguignon, de Melo, and Suwa (1991) and Lofgren (2001).

A limitation of most existing CGE models, however, is that the wage formation mechanisms that are embedded in these models often do not capture the çomplex intersectoral relationships that are observed in practice. As illustrated in the analytical model presented earlier, for instance, feedback effects between formal and informal sector wages play a critical role in the transmission process of macroeconomic shocks in a context in which efficiency considerations (or turnover costs) matter in the determination of formal sector wages. The structure of the labor market has a major impact on the transmission of macroeconomic shocks and adjustment policies to economic activity, employment, and relative prices; but the treatment of this market in applied policy models has often captured only a narrow set of its well-documented features—such as an economy-wide rigid minimum wage (see for instance Maechler and Roland-Host (1995)). Insufficient attention has been paid to the macroeconomic implications of alternative sources of labor market segmentation, differences in wage formation across various labor categories, inter-sectoral wage rigidity (as opposed to aggregate wage rigidity), and feedback effects between relative prices and wage decisions by price-setting firms. All of these features have important implications for understanding the impact of policy and exogenous shocks on poverty. Labor market segmentation, in particular, tends to restrict labor mobility and can be associated with persistent wage differentials; these, in turn, may prevent the reallocation of resources necessary to cope with external and policy-induced shocks. Again, because the poor in many developing countries generate a significant fraction of their income from labor services, modeling these features of the labor market is crucial for understanding the impact of pretty much any type of shocks on poverty in the short and medium run.

A detailed treatment of the labor market is a key feature of the Integrated Macroeconomic Model for Poverty Reduction (IMMPA) developed by Agénor, Izquierdo and Fofack (2001). Another characteristic of IMMPA is that it accounts explicitly for the channels through which various types of public investment outlays affect the economy. Economists and policymakers have long known that different forms of public investment can have different effects on output and employment, but the channels through which alternative forms of public spending operate have seldom been incorporated explicitly in applied macroeconomic models used for development policy analysis.

In IMMPA, investment in infrastructure (or, rather, the stock of public capital in infrastructure) affects directly the level of production in the private sector—and thus the marginal productivity of primary factors employed in that sector—whereas public investment in education has a direct impact on unskilled workers' decision to acquire skills. This effect operates in addition, of course, to movements in relative wages across skill categories and the initial level of individual wealth, which acts as a constraining factor in the presence of credit constraints. IMMPA also allows an analysis of the poverty and distributional effects of policy and exogenous shocks in two ways: first by calculating a set of indicators (for income distribution) based directly on the model's simulation results; second, by linking IMMPA simulation results to a household expenditure survey. There are various country applications under way, most notably for Brazil, Cameroon, and Senegal. Many fruitful lessons on the impact of adjustment on the poor are likely to emerge from them.

5.2 Cross-Country Econometric Evidence

This section presents, in a cross-section empirical framework, some preliminary results on the relationship between macroeconomic factors and poverty in developing countries.[44] The macroeconomic variables examined include several of the variables discussed earlier: public expenditure, inflation, income levels and output growth, and the real exchange rate. In addition, several structural variables are also considered. The estimation method is a simple cross-section, time-series OLS regression model with fixed effects. As discussed in Appendix B, the sample is relatively small (at most 52 observations) and often only one data point is available per country.

Specifically, the dependent variable is the logarithm of the poverty rate ($LPOV$), measured by the headcount index for the population as a whole. The "basic" set of explanatory variables used in the regressions are defined as follows (see Appendix B for more precise definitions):

- $INFL$ is the inflation rate in consumer prices;

[44] Cross-country regressions have been the subject of criticism for their *ad hoc* specification and the fragility of many of the results. See Temple (1999, 2000) for a detailed discussion of the problems that arise in this context and some reasons why they may be, nevertheless, useful tools.

- *STRA_GDP* is the log of the ratio of total subsidies and other current transfers over GDP, which aims at capturing *level* effects of changes in public spending;
- *STRA_CEXP* is the log of the ratio of subsidies and other current transfers in percent of current government expenditure, which aims at capturing *compositional* effects of changes in public spending;
- *ILLITY* is the youth illiteracy rate in percent of the population aged 15-24, which aims to capture the level of education of the labor force;
- *LHOSPITAL* is the log of hospital beds per 1,000 persons, which measures overall health conditions;
- *GDPPC* is GDP per capita at PPP exchange rates, which captures the level of economic development;
- *REALGR* is the annual growth rate of GDP per capita, measured at PPP exchange rates, which can be viewed as either a proxy for the rate of return on investment, or as a measure of cyclical movements in output;
- *REALEX* is the annual rate of change of the real effective exchange rate (defined such that an increase is a depreciation);
- *LURBAN* is the log of the relative share of the urban population in proportion to total population;
- *LTOT* is the log of the terms of trade;
- *VREALXL*, *VINFL*, and *VREALGDP* are measures of macroeconomic volatility, which consist of rolling standard deviations of the real exchange rate, inflation, and real GDP;
- *OPEN* is the ratio of the sum of imports and exports of goods and services in percent of GDP, and aims to capture exposure to external shocks.

The previous discussion suggests that inflation should have a positive effect on poverty. The fiscal variables, subsidies and current transfers as a

proportion of GDP, and the relative share of transfers and subsidies in public current expenditure, have *a priori* an ambiguous effect. The effect of an across-the-board cut in transfers and subsidies, for instance, may be negative; but to the extent that it is accompanied by better targeting, there may be no significant effect on the poverty rate. An increase in the illiteracy rate is expected to be positively correlated with poverty, whereas an improvement in health indicators should be inversely related to poverty. Both the level of GDP per capita and its rate of growth are expected to be negatively correlated with the poverty rate. The effect of a real exchange rate depreciation is in general ambiguous; it is likely to lead to a reduction in poverty if it benefits small farmers in the tradable sector, as is the case in many low-income developing countries. A higher rate of urbanization also has in general an ambiguous effect on aggregate poverty; to the extent that rural-to-urban migration translates into greater access to public services in urban areas, it may lower poverty; but to the extent that inflows of workers in the urban sector lead to an excess supply of labor in the informal sector and lower wages there, it may increase poverty. An improvement in the terms of trade may reduce poverty if it represents an increase in the relative price of agricultural commodities (thereby benefiting small farmers in rural areas) or a fall in the price of imported consumption goods (benefiting mostly households in urban areas). An increase in macroeconomic volatility (associated with output shocks, inflation, or fluctuations in the real exchange rate) is expected to increase poverty, possibly through its adverse effect on growth, as discussed earlier. Finally, the degree of openness has a priori an ambiguous effect on poverty.

Table 1 summarizes some of the basic empirical results. They indicate that inflation, the terms of trade, the degree of openness, the urbanization ratio, the illiteracy rate and the volatility of inflation, do not have a statistically significant impact on poverty.[45] In particular, inflation (despite having the correct sign) has no discernible effect on poverty, in contrast to earlier results by Agénor (1999) and Easterly and Fischer (2001). The fact that the degree of openness has no significant effect on poverty may result from the fact that greater access to imported capital goods leads firms to substitute away from unskilled labor in the production process, as noted earlier. The

[45] I also tried to interact the degree of openness with the terms of trade, on the ground that in more open economies, changes in the terms of trade may have a larger impact on the poor. The variable turned out also to be insignificant.

fiscal variables and the volatility of real GDP were not only insignificant, they also had the wrong sign. Accordingly, they were dropped from the regressions. It is difficult to make much of the fact that public transfers and subsidies are not significant in the regressions; the reason is that our variable may not be adequate, because it does not measure very well what are the subsidies and transfers that actually go to the poor (it includes, for instance, transfers from the government to private and public enterprises).

By contrast, the number of hospital beds has the correct sign and is highly significant in a number of regressions. Both the level of real GDP per capita and its growth rate have the expected negative sign and are highly significant in all regressions. The rate of depreciation of the real exchange rate also has a strong, negative effect on poverty, which is consistent with the view that improvements in the relative price of tradables benefit farmers producing exportables in the agricultural sector. The volatility of the real exchange rate is also highly significant, indicating that macroeconomic instability has an adverse impact on poverty—possibly through its effect on income distribution, as noted earlier. Finally, the fixed effects (which are not reported here to save space) are all statistically significant, suggesting that country-specific factors are important in determining the behavior of poverty rates.

Table 2 extends the analysis in Table 1 to account for the possibility of asymmetric output shocks in both the level of real GDP per capita and its growth rate. Specifically, observations on the level and growth rate of GDP per capita are split into two sub-samples. In both cases, two dummy variables, $DUMMYPOS$ and $DUMMYNEG$, are created; for the level of GDP per capita, the first is equal to 1 times $GDPPC$ when $GDPPC$ at period t is higher than $GDPPC$ at time $t-1$ (and 0 otherwise), and the second is equal to 1 times $GDPPC$ when $GDPPC$ at period t is lower than $GDPPC$ at time $t-1$. For the growth rate, the first is equal to 1 times $REALGR$ when $REALGR$ is positive (and 0 otherwise), and the second equal to 1 times the absolute value of $REALGR$ when $REALGR$ is negative (and 0 otherwise). The results show first that all the variables that were significant in Table 1 remain so; in particular, real exchange rate depreciations and better health conditions tend to lower poverty, whereas macroeconomic volatility tends to increase it. In addition, an improvement in the terms of trade tends now to significantly lower poverty. The results also show that there is no evidence of asymmetric effect of the level of GDP per capita on poverty: both variables have coefficients that are significant and statistically indistinguishable. By contrast, positive growth rates of output

have no statistically significant effect on poverty, whereas higher negative growth rates affects significantly and adversely the poor. A similar result was obtained by De Janvry and Sadoulet (2000) using a more parsimonious regression framework. This asymmetric effect is very important. As noted by De Janvry and Sadoulet (2000, p. 284), to the extent that the growth-poverty correlation results mainly from episodes of negative growth rates and increases in poverty, it may lead to erroneous predictions about the potential of growth-oriented policies to reduce poverty.

Table 3 extends the results of Tables 1 and 2 in two directions. First, a measure of inequality, the Gini coefficient, taken from Dollar and Kraay (2001) is added to the regression. Bourguignon (2000) recently emphasized the importance of including a measure of inequality as a regressor in estimating the impact of growth and standards of living on poverty; the previous discussion also suggests the same approach. Second, to test for possible endogeneity problems with respect to income, both the level and the rate of growth of GDP per capita are lagged by one period. The regressions show that the previous results remain by and large unchanged; health conditions, and improvements in the terms of trade, tend to lower poverty, whereas macroeconomic volatility and a higher degree of inequality tend to increase it. However, the rate of depreciation of the real exchange rate becomes insignificant when the sample is split to test for asymmetric effects. Furthermore, the evidence suggests again an asymmetric effect on the rate of growth of income per capita, not in the level of that variable. In line with the previous characterization of the sources of asymmetry, a possible explanation of the latter result is that the rate of growth acts as a proxy for the rate of return on capital. In recessions (or periods of negative growth), the perceived degree of uncertainty about future profitability increases, which leads firms to adopt a "wait and see" attitude in a recovery (at least in the early phases), as a result of irreversibility effects.

The foregoing results are, without a doubt, very suggestive. Nevertheless, it is important to note that data limitations and the relatively small number of degrees of freedom limit their reliability. For instance, it would be preferable to have a more accurate estimate of the share of transfers going to poor households only, as opposed to households in general. Also, measured poverty rates in the sample may be overstated to the extent that the estimate of income reflects only market or market-related activities. Expanding the database used here would allow expanding the range of variables to be tested—such as for instance the impact of inequality in assets, as opposed to

income. In the same vein it would be useful to develop a measure of financial openness (in addition to the trade openness index used in the regressions) in order to assess the impact of international financial integration on poverty. Finally, it should be noted that the role of the labor market is only implicit (or indirect) in the regression framework used above. Extending the analysis to account explicitly for labor market variables (such as changes in unemployment, which are only imperfectly correlated with changes in output growth) would allow a more precise assessment of its importance in the transmission of macroeconomic policy to poverty.

6 Summary and Conclusions

The purpose of this paper has been to examine analytically and empirically the various channels through which stabilization policies affect poverty in developing countries, with a particular emphasis on the role of the labor market. Macroeconomic policies must, of course, be evaluated in terms of their macroeconomic objectives; in addition, however, it is important to understand their short-term impact on poverty. This issue has been the subject of renewed interest in studies of economic adjustment in developing countries.

The first part of the paper provided a brief review of the recent evidence on poverty, and highlighted the large differences between and within regions of the developing world. The second part provided an analytical overview of the various channels through which macroeconomic policies affect the poor. It was argued, in particular, that a reduction in government expenditure on transfers and subsidies (measured either as a proportion of GDP or as a share of total spending) does not necessarily hurt the poor if it is accompanied by a better targeting of benefits. It was also pointed out that there are several factors suggesting that macroeconomic adjustment might benefit the poor. If the tradable goods sector is labor intensive, the poor will gain from the relative price shifts associated with a real exchange rate depreciation. At the same time, a reduction in (policy-induced) macroeconomic volatility is likely to lead to an increase in savings and investment rate, and thus be conducive to growth. However, these predictions must be qualified because various other factors may mitigate the positive impact of adjustment on the poor. Structural characteristics (such as the extent of price and wage flexibility, the degree of inter-sectoral mobility of the unskilled labor force, the extent to which the poor consume tradable goods, and the extent to which they

are directly affected by cuts in public expenditure) vary considerably across countries and make it necessary to address these issues on a case by case basis.

The third part presented an analytical framework that captures some of the main features of the urban labor market in developing countries—a large informal sector, efficiency wages and minimum wage legislation in the formal economy, and imperfect mobility of the unskilled labor force across sectors. Unemployment of both skilled and unskilled workers was shown to emerge in equilibrium, despite wage flexibility in the informal sector. Skilled unemployment emerges because the opportunity cost of leisure is low and/or the reservation wage is higher than the going wage in the informal sector, whereas unskilled unemployment results from "wait" or "queuing" considerations in the tradition of Harris and Todaro (1970). The model was used to study the macroeconomic effects of fiscal adjustment, namely, an increase in lump-sum taxes on upper-income households. The analysis suggested that in the long run this policy leads to a real exchange rate depreciation and lower unemployment of both categories of labor. It also lowers poverty (with the poor defined as unemployed workers and those employed in the informal sector). This experiment serves to illustrate the importance of accounting for general equilibrium effects in assessing the impact of macroeconomic adjustment on poverty; whereas the direct, partial equilibrium effect of higher taxes is to reduce aggregate demand and employment, the changes in relative prices and wages that result from the initial response of the economy may translate into economy-wide movements in labor demand and output. These movements may operate in opposite direction to the initial effects—so much so that a seemingly adverse shock may end up being beneficial for the poor.

The fourth part provided a brief overview of some of the existing empirical studies focusing on the effect of macroeconomic adjustment on poverty, and presented some cross-country econometric results focusing on some of the factors identified in the previous sections—such as output growth, the real exchange rate, government expenditure (distinguishing both level effects and compositional effects, as measured by the share of subsidies and other transfers in total public expenditure), inflation, and macroeconomic volatility—as well as structural factors (degree of urbanization, health conditions, illiteracy rate, and the degree of income inequality). Although the results should be treated with some caution given the relatively short sample size, they suggest that higher levels of per capita income, real exchange rate depreciations, better health conditions, and improvements in the terms of trade lower

poverty, whereas greater income inequality, higher illiteracy, and macroeconomic volatility (as measured by the volatility of the real exchange rate) tend to increase it. In addition, real output growth per capita was found to have an asymmetric effect: positive growth rates are not statistically significant, whereas higher negative growth rates are significant and tend to raise poverty. Ignoring this asymmetric effect may lead to overestimating the potential of growth-oriented policies to reduce poverty.

The analysis presented in this paper can be extended in various directions. The cross-country econometric results presented here could be extended to explicitly account for the structure of the labor market and the role of labor market variables in the transmission of macroeconomic policy shocks. For instance, labor market regulations, by reducing the demand for unskilled labor in the formal economy, may tend to raise poverty in both the short and the long term. Fallon and Lucas (1993), for instance, showed that in Zimbabwe job security regulations (including restrictions on firms' ability to dismiss redundant workers) reduced employment by increasing adjustment costs and reducing efficiency. More generally, the evidence appears to suggest that countries that have managed to reduce poverty dramatically have all typically been able to increase the demand for unskilled labor rapidly. To the extent that labor market imperfections hamper the creation of (unskilled) jobs, there may be a close link between reforms aimed at improving the functioning of the labor market and policies aimed at alleviating poverty.

Another potentially fruitful area of research is related to the degree of inter-sectoral mobility of the labor force. As noted earlier, the speed of labor reallocation plays a crucial role in understanding the impact of shocks on poverty and the labor market. However, the available evidence on the degree of labor mobility across sectors in developing countries remains rather scant. In practice, labor mobility depends on a variety of factors, such as employment protection regulations (most notably administrative restrictions on hiring, plant closure and layoffs of permanent labor, and the generosity of severance payments) and other microeconomic considerations, such as proximity and family ties. Fallon and Riveros (1989) took the fact that wage differentials during the early 1980s tended to widen in favor of expanding (tradable) sectors in the urban sector in Argentina, Chile, Colombia, Mexico, and Uruguay as indicating less than perfect labor mobility. However, differences in the pattern of wage formation across industries may well explain such movements. There is a need therefore to extend research on these

issues.[46] One possibility would be to follow the approach of Dickens and Lang (1985), which relies on switching regression analysis.[47] The Dickens-Lang method could be used to test for the presence of non-economic barriers to formal sector employment. Their approach suggests postulating a mechanism for allocation of workers between the formal and informal sectors in the absence of rationing, based on workers' employment choices. Assuming that workers have perfect information and would behave so as to maximize utility over their lifetime, then they would choose formal sector employment if the net present value of their income stream in the formal economy exceeded that of the informal sector. This proposition can be tested by a series of constraints on the switching regression.[48] But in practice, assessing the degree of mobility between the formal and informal sectors in developing countries is difficult because data on migration flows between these sectors are generally not available. However, the model developed earlier suggests that the ratio of formal sector wages (for workers with low qualifications) to informal sector wages can be a useful empirical proxy. The model, in fact, suggests an ambiguous effect of the wage differential on poverty, to the extent that the poor are viewed as consisting of all workers in the informal sector as well as the openly unemployed in the formal economy.[49] A fall in the formal-informal wage ratio, for instance, increases the flow of (low-skilled) workers to the informal sector. To the extent that these workers were previously unemployed, poverty would not change; but to the extent that they were initially employed in the formal sector, poverty would naturally increase. Similarly, a rise in the wage ratio would have an ambiguous effect on poverty because those workers who move to the formal sector to seek a job there may well be unsuccessful and end up joining the ranks of the unemployed. What the foregoing discus-

[46]Note that in the analytical framework described earlier, the size of the labor supply seeking employment in the formal economy does not depend on the speed of adjustment in the long run; only the transitional dynamics are affected.

[47]Leontaridi (1998) provides a more detailed discussion of the Dickens-Lang approach.

[48]Essentially, if the hypothesis of workers' free choices of sectors is to be accepted, and tastes for the non-pecuniary aspects of employment are independent of individual characteristics (such as the place of residence, marital status, the level of education, and so on), then one would expect that the coefficients of the variables describing these characteristics in the switching equation to be equal to the coefficients in the two wage equations. Failure to accept this restriction can be viewed as *prima facie* evidence of non-economic barriers to employment in the formal sector.

[49]This discussion assumes that the employment probability in the formal economy does not change significantly in the short run.

sion suggests, nevertheless, is that adding the formal-informal sector wage ratio as an independent variable in the type of poverty regressions presented earlier may be one way to capture, with appropriate auxiliary assumptions, the effect of intersectoral labor flows on poverty rates.

Appendix A
Solution and Dynamic Form of the Model

The first step in solving the model is to determine the short-run market-clearing solutions of the real exchange rate and the real wage in the informal sector (measured in terms of the price of exports). To do so, substitute (10) in (14) to give

$$c_R = \alpha[Y_X^s(z) + i^* B^* - T] + \upsilon B^*.$$

This equation can be written as

$$c_R = \phi(\overset{+}{z}, \overset{+}{B^*}; \overset{-}{T}). \tag{A1}$$

where

$$\phi_z = \alpha(\partial Y_X^s/\partial z), \quad \phi_{B^*} = \alpha i^* + \upsilon, \quad \phi_T = -\alpha.$$

A real depreciation, an increase in the stock of traded bonds, or a fall in taxes stimulate consumption of the rich.

Similarly, substituting (13) in (17) yields

$$c_P = z^{-1} Y_N^s(\omega_N z). \tag{A2}$$

Using the equilibrium solution for ω_N, equation (21), in (A2), and using (A1), the equilibrium condition of the market for nontraded goods, equation (19), can be written as

$$Y_N^s[\omega_N(z, n_U^s)z] = \delta z[\phi(z, B^*; T) + c_P],$$

that is, using (A2):

$$Y_N^s[\omega_N(z, n_U^s)z] = \frac{\delta}{1-\delta} z\phi(z, B^*; T). \tag{A3}$$

Equation (A3) can be solved for the equilibrium real exchange, z:

$$z = \theta(\overset{-}{n_U^s}, \overset{-}{B^*}; \overset{+}{T}), \tag{A4}$$

where

$$\theta_{n_U^s} = -\Omega^{-1} Y_N^{s'} (\frac{\partial \omega_N}{\partial n_U^s}), \quad \theta_{B^*} = \frac{\delta(\alpha i^* + \upsilon)}{\Omega(1-\delta)}, \quad \theta_T = -\frac{\alpha\delta}{\Omega(1-\delta)}.$$

and, with a '~' denoting a steady-state value:

$$\Omega = Y_N^{s'}(1 + \frac{\partial \omega_N}{\partial z}) - \frac{\delta}{1-\delta}(\tilde{c}_R + \phi_z),$$

that is, because the first term in the expression for Ω is zero from (21):

$$\Omega = -\frac{\delta}{1-\delta}[\tilde{c}_R + \alpha(\frac{\partial Y_X^s}{\partial z})] < 0.$$

An increase in taxes, for instance, lowers consumption of the upper-income household and creates excess supply in the market for informal sector goods. The real exchange rate must therefore depreciate to restore equilibrium.

Substituting this result in the informal labor market equilibrium condition (equation (21)) yields:

$$\omega_N = \kappa(\overset{+}{n_U^s}, \overset{+}{B^*}; \overset{-}{T}). \tag{A5}$$

where

$$\kappa_{n_U^s} = (\frac{\partial \omega_N}{\partial z})\theta_{n_U^s} + (\frac{\partial \omega_N}{\partial n_U^s}),$$

$$\kappa_{B^*} = (\frac{\partial \omega_N}{\partial z})\theta_{B^*} = -\theta_{B^*}, \quad \kappa_T = (\frac{\partial \omega_N}{\partial z})\theta_T = -\theta_T.$$

An increase in the supply of unskilled labor in the formal sector, for instance, creates an excess demand for labor in the informal economy, thereby putting upward pressure on wages there.

The second step is to substitute (10) for Y_X^s, (A4) for z in the resulting equation, and re-write the upper-income household's budget constraint, equation (15), as

$$\dot{B}^* = (1-\alpha)\left[Y_X^s[\theta(n_U^s, B^*; T)] + i^* B^* - T\right] - \upsilon B^*.$$

This equation can be written as

$$\dot{B}^* = G(\bar{n}_U^s, \overset{?}{B^*}; \bar{T}), \tag{A6}$$

with

$$G_{n_U^s} = (1-\alpha)(\frac{\partial Y_X^s}{\partial z})\theta_{n_U^s},$$

$$G_T = (1-\alpha)[(\frac{\partial Y_X^s}{\partial z})\theta_T - 1] = -(1-\alpha)\left[1 - \frac{\alpha(\partial Y_X^s/\partial z)}{\tilde{c}_R + \alpha(\partial Y_X^s/\partial z)}\right].$$

and

$$G_{B^*} = (1-\alpha)[i^* + (\frac{\partial Y_X^s}{\partial z})\theta_{B^*}] - \upsilon,$$

that is

$$G_{B^*} = (1-\alpha)i^*\left[1 - \frac{\alpha(\partial Y_X^s/\partial z)}{\tilde{c}_R + \alpha(\partial Y_X^s/\partial z)}\right] - \upsilon\left[1 + \frac{(1-\alpha)(\partial Y_X^s/\partial z)}{\tilde{c}_R + \alpha(\partial Y_X^s/\partial z)}\right]. \tag{A7}$$

In general, the sign of G_{B^*} is indeterminate. In what follows it will be assumed that the wealth effect, as measured by υ, is sufficiently large to ensure that $G_{B^*} < 0$.[50] Note also that an increase in T, for n_U^s and B^* given, lowers the flow of savings (so that $\dot{B}_0^* < 0$).

The last step is to determine the flow changes in labor supply to the formal sector. Substituting (8) in the second equation of (9) yields $n_U^d = n_U^d(z, \omega_m)$, that is, using (A4):

$$n_U^d = L(\bar{n}_U^s, \bar{B}^*; \overset{+}{T}).$$

[50] Equation (A7) shows that if $\upsilon = 0$, $G_{B^*} > 0$. It can be verified by looking at the stability conditions given below that in this case the model is unstable because the roots of the matrix of coefficients are of opposite sign. Note also that the higher α is, the more likely the condition $G_{B^*} < 0$ will be satisfied. In the particular case where $\alpha = 1$, $G_{B^*} = -\upsilon$.

Substituting this result, together with (A5) for ω_N in (22) yields

$$\dot{n}_U^s = \beta \left\{ \frac{\omega_m L(n_U^s, B^*; T)}{n_U^s} - \kappa(n_U^s, B^*; T) \right\},$$

that is

$$\dot{n}_U^s = \beta \Psi(\bar{n_U^s}, \bar{B^*}; \overset{+}{T}) \tag{A8}$$

where

$$\Psi_{n_U^s} = \frac{\omega_m}{\tilde{n}_U^s} \left[L_{n_U^s} - \frac{\tilde{n}_U^d}{\tilde{n}_U^s} \right] - \kappa_{n_U^s}, \quad \Psi_{B^*} = \frac{\omega_m L_{B^*}}{\tilde{n}_U^s} - \kappa_{B^*},$$

$$\Psi_T = \frac{\omega_m L_T}{\tilde{n}_U^s} - \kappa_T,$$

Equation (A8) shows, in particular, that an increase in n_U^s tends to lower unskilled migration flows towards the formal economy, as a result of three effects. First, it lowers the supply of labor in the informal sector—which tends to increase the market-clearing wage, and thus the opportunity cost of queueing. Second, it lowers the demand for unskilled labor in the formal sector; the reason is that by increasing wages in the informal economy, it lowers the supply of informal sector goods, thereby requiring a real appreciation to maintain equilibrium in the market for these goods (see (A4)). As a result, the efficiency wage increases, thereby reducing the demand for both skilled and unskilled workers. Third, it lowers (at a given level of the demand for labor in the formal economy) the employment probability. The last two effects combine to reduce the expected wage in the formal sector. All three effects combine therefore to reduce migration flows from the informal sector to the formal economy. Note also that an increase in T, for n_U^s and B^* given, raises the flow of unskilled workers seeking employment in the formal economy (so that $\dot{n}_U^s(0) > 0$).

Equations (A6) and (A8) represent the dynamic equations of the system. Using a linear approximation around the steady state yields

$$\begin{bmatrix} \dot{n}_U^s \\ \dot{B}^* \end{bmatrix} = \begin{bmatrix} \beta\Psi_{n_U^s} & \beta\Psi_{B^*} \\ G_{n_U^s} & G_{B^*} \end{bmatrix} \begin{bmatrix} n_U^s - \tilde{n}_U^s \\ B^* - \tilde{B}^* \end{bmatrix}. \tag{A9}$$

Necessary and sufficient conditions for (A9) to be (locally) stable are that the matrix of coefficients has

- a negative trace ($\beta\Psi_{n_U^s} + G_{B^*} < 0$), which guarantees at least one negative root;
- a positive determinant, which ensures that the roots are of the same sign:

$$\Delta = \beta(G_{B^*}\Psi_{n_U^s} - G_{n_U^s}\Psi_{B^*}) > 0.$$

The first condition is always satisfied. The second condition requires, as shown in Figure 4, that the slope of LL be steeper in absolute value than the slope of BB.

Using (A6) and (A8), it can readily be shown that a rise in T increases n_U^s and lowers B^* in the long run:

$$\frac{d\tilde{n}_U^s}{dT} = \frac{\beta(\Psi_{B^*}G_T - \Psi_T G_{B^*})}{\Delta} > 0, \quad \frac{d\tilde{B}^*}{dT} = \frac{\beta(\Psi_T G_{n_U^s} - \Psi_{n_U^s}G_T)}{\Delta} < 0,$$

Using these results, it can be established from (A4) and (A5) that in the long run the real exchange rate depreciates ($dz/dT > 0$) and that wages in the informal sector rise ($d\tilde{\omega}_N/dT > 0$). The first effect implies that the demand for unskilled labor in the formal sector rises as well ($d\tilde{n}_U^d/dT > 0$). From (24), $\tilde{n}_U^s = \omega_m\tilde{n}_U^d/\tilde{\omega}_N$. The effect of T on the steady-state *level* of unskilled unemployment in the formal sector is thus

$$\frac{d(\tilde{n}_U^s - \tilde{n}_U^d)}{dT} = (\frac{\omega_m}{\tilde{\omega}_N})\frac{d\tilde{n}_U^d}{dT} - \frac{\omega_m\tilde{n}_U^d}{\tilde{\omega}_N^2}\frac{d\tilde{\omega}_N}{dT} - \frac{d\tilde{n}_U^d}{dT},$$

that is

$$\frac{d(\tilde{n}_U^s - \tilde{n}_U^d)}{dT} = (\frac{\omega_m}{\tilde{\omega}_N} - 1)\frac{d\tilde{n}_U^d}{dT} - \frac{\omega_m\tilde{n}_U^d}{\tilde{\omega}_N^2}\frac{d\tilde{\omega}_N}{dT},$$

Because $d\tilde{n}_U^d/dT > 0$ and $\omega_m/\tilde{\omega}_N > 1$, the first term on the right-hand side is positive. The second term is negative, because $d\tilde{\omega}_N/dT > 0$. Thus, the impact of higher taxes on the level of unskilled unemployment is ambiguous. The effect on the unskilled unemployment *rate* in the urban formal sector is

$$\frac{d}{dT}(\frac{\tilde{n}_U^s - \tilde{n}_U^d}{\tilde{n}_U^s}) = \frac{d}{dT}(1 - \frac{\tilde{n}_U^d}{\tilde{n}_U^s}),$$

that is, using (24):

$$\frac{d}{dT}(1-\frac{\tilde{\omega}_N}{\omega_m}) = -\omega_m^{-1}\frac{d\tilde{\omega}_N}{dT} < 0.$$

Thus, the unemployment rate falls unambiguously in the long run, implying that labor demand rises by more than labor supply in proportional terms.

Appendix B
Data Sources and Country Lists

Regressions with the complete sample are based on the following list of countries (years of observation in parentheses): Algeria (1988, 1995), Argentina (1991, 1993), Bangladesh (1992, 1996), Benin (1995), Brazil (1990, 1996, 1998), Burundi (1990), Cambodia (1994, 1997), Chad (1996), Chile (1992, 1994), Colombia (1991, 1992), Dominican Republic (1989, 1992), Ecuador (1994), Egypt (1996), El Salvador (1992), Gambia (1992), Ghana (1992), Guatemala (1989), Guinea (1994), Guinea-Bissau (1991), Haiti (1987), Honduras (1992, 1993), India (1992, 1994), Indonesia (1987, 1990, 1996, 1998-99), Jamaica (1992), Jordan (1991, 1997), Kenya (1992), Lesotho (1993), Madagascar (1994), Malawi (1991), Malaysia (1989), Mauritania (1990), Mauritius (1992), Mexico (1988), Morocco (1985, 1991, 1999), Nepal (1996), Nicaragua (1993), Niger (1992), Nigeria (1985, 1992), Pakistan (1990), Panama (1997), Paraguay (1991), Peru (1986, 1991, 1994, 1997), Philippines (1985, 1991, 1994, 1997), Rwanda (1993), Sierra Leone (1989), Sri Lanka (1986, 1991, 1996), Tanzania (1991), Thailand (1990, 1992), Togo (1989), Trinidad and Tobago (1992), Tunisia (1985, 1990), Uganda (1998), Venezuela (1989), Yemen (1992), Zambia (1991, 1993), Zimbabwe (1991).

The observations on the Gini coefficient obtained from the database of Dollar and Kraay (2001) are as follows (years of observation in parentheses): Algeria (1988, 1995), Bangladesh (1992, 1995), Brazil (1990, 1996-97), Cambodia (1997), Chile (1992, 1994), Colombia (1991), Dominican Republic (1989,1992), Ecuador (1994), Egypt (1991), El Salvador (1989), Gambia (1992), Ghana (1992), Guatemala (1989), Guinea (1994), Guinea-Bissau (1991), Honduras (1992-93), India (1992, 1994), Indonesia (1987, 1990, 1996, 1999), Jamaica (1992), Jordan (1991, 1997), Kenya (1992), Lao PDR (1992), Lesotho (1993), Madagascar (1993), Malawi (1993), Malaysia (1989), Mauritania (1988), Mauritius (1991), Mexico (1989), Morocco (1984, 1991), Nepal (1996), Nicaragua (1993), Niger (1992), Nigeria (1985, 1993), Pakistan (1991), Panama (1997), Paraguay (1991), Peru (1986, 1994, 1997), Philippines (1985, 1991, 1994, 1997), Sierra Leone (1989), Sri Lanka (1985, 1990, 1995), Tanzania (1991), Thailand (1990, 1992), Trinidad and Tobago (1992), Tunisia (1985, 1990), Venezuela (1989), Yemen (1992), Zambia (1991, 1993), Zimbabwe (1990).

For several countries in the sample, the year of observation of the Gini coefficient taken from the Dollar-Kraay database does not correspond to the

year of observation of the poverty headcount rate available in the World Bank's LDB database and used for the regressions in Tables 1 and 2. We therefore used the closest year for which the Gini coefficient was available. This gives the following approximations, with the first year in parentheses indicating the poverty observation: Bangladesh (1995, Gini observation used for 1996), Brazil (1997, Gini observation used for 1998), Egypt (1991, Gini observation used for 1996), El Salvador (1989, Gini observation used for 1992), Lao PDR (1992, Gini observation used for 1993), Madagascar (1993, Gini observation used for 1994), Malawi (1993, Gini observation used for 1991), Mauritania (1988, Gini observation used for 1990), Mauritius (1991, Gini observation used for 1992), Mexico (1989, Gini observation used for 1988), Morocco (1984, Gini observation used for 1985), Niger (1992, Gini observation used for 1993), Sri Lanka (1985, 1990, 1995, Gini observations used respectively for 1986, 1991, 1996), and Zimbabwe (1990, Gini observation used for 1991).

The list and sources of the variables used in the regressions shown in Tables 1 to 3 is as follows:

- *LPOV*: Log of the poverty index. Source: World Bank LDB Database.
- *INFL*: Inflation rate in consumer prices. Source: 2001 *World Development Indicators* CD-ROM (WDI).
- *STRA_GDP* is the log of the ratio of total subsidies and other current transfers over GDP. Source: WDI.
- *STRA_CEXP* is the log of the ratio of subsidies and other current transfers in percent of current government expenditure. Source: WDI.
- *ILLITY*: Youth total illiteracy rate in percent of people ages 15-24. Source: WDI.
- *LHOSPITAL*: Log of hospital beds per 1,000 people. Source: WDI.
- *GDPPC*: GDP per capita at PPP exchange rates. Source: WDI.[51]

[51] In WDI, PPP GDP is defined as gross fdomestic product converted to international dollars using purchasing power parity rates. An interntational dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. PPP exchange rates provide a standard measure allowing comparison of real price levels between countries. The PPP conversion factors used in WDI are derived from price surveys conducted by the International Comparison Program (ICP).

- *REALGR*: the annual growth rate of GDP per capita, measured at PPP exchange rates. Source: WDI.
- *DUMMYPOS*: Dummy equals 1 times *GDPPC* (*REALGR*) whenever *GDPPC* at t is greater than *GDPPC* at $t-1$ (*REALGR* is positive), 0 otherwise.
- *DUMMYNEG*: Dummy equals 1 times *GDPPC* (the absolute value of *REALGR*) whenever *GDPPC* at t is lower than *GDPPC* at $t-1$ (*REALGR* is negative, 0 otherwise.
- *REALEX*: Percentage change in real effective exchange rate. A rise is a depreciation. Source: *International Financial Statistics*, IMF.
- *OPEN*: Ratio of the sum of imports and exports of goods and services in percent of GDP. Source: WDI.
- *LURBAN*: Urban population in percent of total. Source: WDI.
- *LTOT*: Log of terms of trade index. Source: WDI.
- *VREALXL*: Volatility measure of real effective exchange rate. It equals the ratio of the standard deviation of real effective exchange rate at t, $t-1$, $t-2$, $t-3$ to the average of it for the same period.
- *VINFL*: Volatility measure of inflation. It equals the ratio of the standard deviation of inflation at t, $t-1$, $t-2$, $t-3$ to the average of it for the same period.
- *VREALGDP*: Volatility measure of real GDP per capita. It equals the ratio of the standard deviation of real GDP per capita at t, $t-1$, $t-2$, $t-3$ to the average of it for the same period.
- *GINI*: Gini coefficient. Source: Dollar and Kraay (2001).

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Table 1
Developing Countries: Determinants of the Poverty Rate
(OLS with fixed effects)

	Dependent variable: Log of headcount poverty index							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
INFL	0.272	0.227	0.256	0.333	0.343	0.208	0.251	0.240
	(1.262)	(1.001)	(1.133)	(1.359)	(1.418)	(1.096)	(1.038)	(0.973)
ILLITY	-0.118		-0.345	-0.191	-0.189			
	(-0.798)		(-1.407)	(-1.155)	(-1.103)			
LHOSPITAL	-0.408	-0.666		-0.575	-0.673	-0.387	-0.788	-0.697
	(-1.265)	(-2.094)		(-1.809)	(-2.511)	(-1.206)	(-2.788)	(-2.220)
GDPPC	-1.246	-0.857	-1.021	-1.069	-1.019	-1.215	-0.814	-0.859
	(-2.624)	(-4.360)	(-3.182)	(-3.743)	(-3.824)	(-2.810)	(-4.582)	(-4.345)
REALGR	-1.216	-1.159	-1.065	-1.309	-1.409	-1.271	-1.482	-1.388
	(-2.779)	(-1.922)	(-2.326)	(-2.402)	(-3.135)	(-3.243)	(-3.346)	(-2.579)
REALEX	-0.501	-0.552	-0.474	-0.560	-0.541	-0.502	-0.549	-0.566
	(-4.776)	(-4.393)	(-5.079)	(-4.206)	(-4.176)	(-4.964)	(-4.020)	(-4.045)
OPEN		0.124		0.093				0.088
		(0.628)		(0.507)				(0.494)
LURBAN	0.996					1.287		
	(0.965)					(1.320)		
LTOT	-0.142	-0.116	-0.144	-0.057	-0.150	-0.174	-0.227	-0.140
	(-1.050)	(-0.541)	(-0.810)	(-0.266)	(-0.916)	(-1.191)	(-1.252)	(-0.689)
VREALXL	1.169	1.329	1.319	1.321	1.354	1.283	1.548	1.519
	(4.244)	(5.018)	(4.156)	(5.028)	(5.142)	(5.002)	(6.798)	(7.044)
VINFL	0.031	0.105						
	(0.419)	(1.149)						
Adj. R2	0.901	0.904	0.898	0.903	0.908	0.913	0.911	0.907
Number of obs.	74	75	76	74	74	75	75	75
Standard Error of Regression	0.159	0.159	0.163	0.158	0.154	0.151	0.152	0.156

Note: INFL is the annual change in the consumer price index. ILLITY is the log of the illiteracy rate for the youth in percent of total population. LHOSPITAL is the log of the number of beds per 1000 people. GDPPC is the log of the GDP per capita (purchasing power parity). REALGR is the annual growth of GDP per capita (purchasing power parity). REALEX is the annual change in the real effective exchange rate index (a rise is depreciation). OPEN is the log of the ratio of the sum of imports and exports of goods and services to GDP (all in nominal terms). LURBAN is the log of the urban population in percent of total population. LTOT is the log of the terms of trade. The volatility measures are calculated as the ratio of the standard deviation of a variable for t, t-1, t-2 and t-3 to the average value for the same period. VREALXL is the volatility measure of the real effective exchange rate. VINFL is the volatility measure of the inflation rate.

Table 2
Developing Countries: Asymmetric Effects on Poverty
(OLS with fixed effects)

	Dependent variable: Log of headcount poverty index				
	(1)	(2)	(3)	(4)	(5)
INFL	0.213	0.178	0.203	0.231	0.186
	(1.162)	(0.879)	(1.031)	(1.133)	(1.011)
ILLITY	-0.081			-0.105	
	(-0.726)			(-0.937)	
LHOSPITAL	-0.697	-0.731	-0.894	-0.662	-0.710
	(-2.075)	(-2.638)	(-3.842)	(-2.365)	(-2.137)
NEGREALGR	3.096	3.151	3.540	3.028	3.095
	(2.082)	(2.091)	(2.509)	(2.069)	(2.153)
POSREALGR	0.620	0.953	0.763	0.899	0.635
	(0.675)	(1.050)	(0.860)	(1.005)	(0.689)
NEGGDPPC	-0.873	-0.704	-0.634	-0.826	-0.818
	(-1.904)	(-4.046)	(-3.856)	(-3.226)	(-1.838)
POSGDPPC	-0.894	-0.729	-0.656	-0.849	-0.840
	(-1.965)	(-4.217)	(-4.045)	(-3.360)	(-1.899)
REALEX	-0.761	-0.837	-0.813	-0.822	-0.762
	(-4.582)	(-6.032)	(-5.777)	(-6.191)	(-4.664)
OPEN		0.152		0.153	
		(1.030)		(1.025)	
LURBAN	0.428				0.545
	(0.436)				(0.566)
LTOT	-0.314	-0.237	-0.376	-0.187	-0.345
	(-2.181)	(-1.392)	(-2.282)	(-1.027)	(-2.287)
VREALXL	1.532	1.681	1.714	1.567	1.596
	(5.076)	(8.227)	(8.081)	(6.416)	(5.438)
Adj. R2	0.913	0.920	0.924	0.914	0.920
Number of obs.	74	75	75	74	75
Standard Error of Regression	0.149	0.145	0.141	0.148	0.145

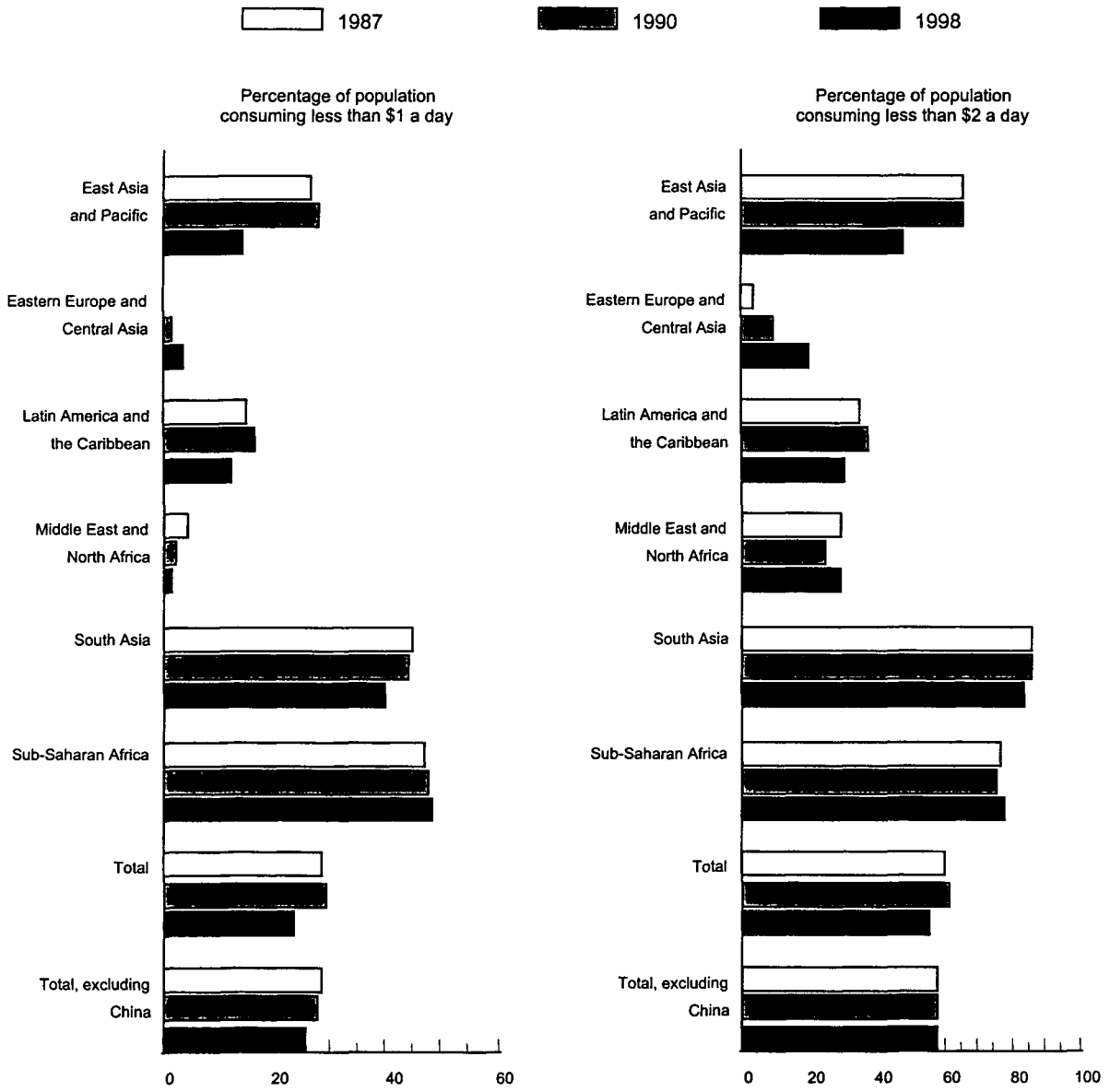
Note: INFL is the annual change in the consumer price index. ILLITY is the log of the illiteracy rate for the youth in percent of total population. LHOSPITAL is the log of the number of beds per 1000 people. NEGREALGR (POSREALGR) is equal to 1 times the absolute value of REALGR (growth rate of GDP per capita) when REALGR is negative (positive), zero otherwise. NEGGDPPC (POSGDPPC) is equal to 1 times GDPPC (level of GDP per capita) when GDPPC is lower (higher) than GDPPC(-1) , zero otherwise. REALEX is the annual change in the real effective exchange rate index (a rise is depreciation). OPEN is the log of the ratio of the sum of imports and exports of goods and services to GDP (all in nominal terms). LURBAN is the log of the urban population in percent of total population. LTOT is the log of the terms of trade. The volatility measures are calculated as the ratio of the standard deviation of a variable for t, t-1, t-2 and t-3 to the average value for the same period. VREALXL is the volatility measure of the real effective exchange rate.

Table 3
Developing Countries: Inequality and Asymmetric Effects on Poverty
(OLS with fixed effects)

	Dependent variable: Log of headcount poverty index									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
INFL	0.382	0.397	0.379	0.386	0.346	0.284	0.278	0.149	0.109	0.064
	(1.389)	(1.562)	(1.433)	(2.383)	(2.373)	(1.902)	(1.971)	(1.000)	(0.651)	(0.419)
ILLITY	-0.006			-0.203	-0.171	-0.282		-0.074		
	(-0.044)			(-1.333)	(-1.214)	(-1.674)		(-0.536)		
LHOSPITAL	-0.649	-0.784	-0.653	-0.547	-0.380		-0.508	-0.540	-0.627	-0.699
	(-2.266)	(-2.145)	(-2.325)	(-1.668)	(-1.804)		(-2.377)	(-1.642)	(-2.142)	(-3.523)
GDPPC(-1)	-0.556	-0.455	-0.551	-0.929	-1.031	-1.101	-0.860			
	(-2.702)	(-1.431)	(-4.186)	(-2.712)	(-4.157)	(-4.250)	(-5.562)			
REALGR(-1)	-1.523	-1.681	-1.528	-1.700	-1.473	-1.276	-1.486			
	(-2.838)	(-2.431)	(-2.971)	(-2.787)	(-3.245)	(-2.918)	(-3.195)			
NEGREALGR(-1)								3.797	3.713	5.046
								(1.569)	(1.602)	(3.826)
POSREALGR(-1)								0.112	0.220	0.562
								(0.106)	(0.194)	(0.957)
NEGGDPPC(-1)								-0.777	-0.669	-0.605
								(-2.451)	(-4.024)	(-3.914)
POSGDPPC(-1)								-0.796	-0.692	-0.628
								(-2.587)	(-4.333)	(-4.257)
REALEX	-0.227	-0.224	-0.227	-0.611	-0.629	-0.634	-0.662	-0.234	-0.223	
	(-2.229)	(-2.144)	(-2.245)	(-3.479)	(-4.027)	(-4.176)	(-4.105)	(-0.943)	(-0.888)	
OPEN								0.042	0.020	
								(0.215)	(0.119)	
LURBAN		-0.364		-0.502						
		(-0.423)		(-0.603)						
LTOT	-0.152	-0.174	-0.154	-0.483	-0.467	-0.507	-0.497	-0.468	-0.505	-0.530
	(-0.864)	(-0.902)	(-0.861)	(-3.075)	(-3.050)	(-3.118)	(-3.019)	(-2.157)	(-2.465)	(-3.792)
VREALXL	1.105	1.119	1.109	1.116	1.124	1.188	1.211	0.614	0.651	0.397
	(3.702)	(3.662)	(3.724)	(4.240)	(4.448)	(4.609)	(4.605)	(1.154)	(1.306)	(1.299)
LGINI				1.182	1.125	1.194	0.908	0.939	0.845	0.854
				(2.060)	(2.082)	(2.184)	(2.179)	(1.966)	(2.205)	(2.341)
Adj. R2	0.888	0.890	0.896	0.894	0.901	0.905	0.908	0.887	0.899	0.982
Number of obs.	74	75	75	64	64	66	65	64	65	65
Standard Error of Regression	0.170	0.170	0.165	0.165	0.159	0.158	0.156	0.171	0.163	0.151

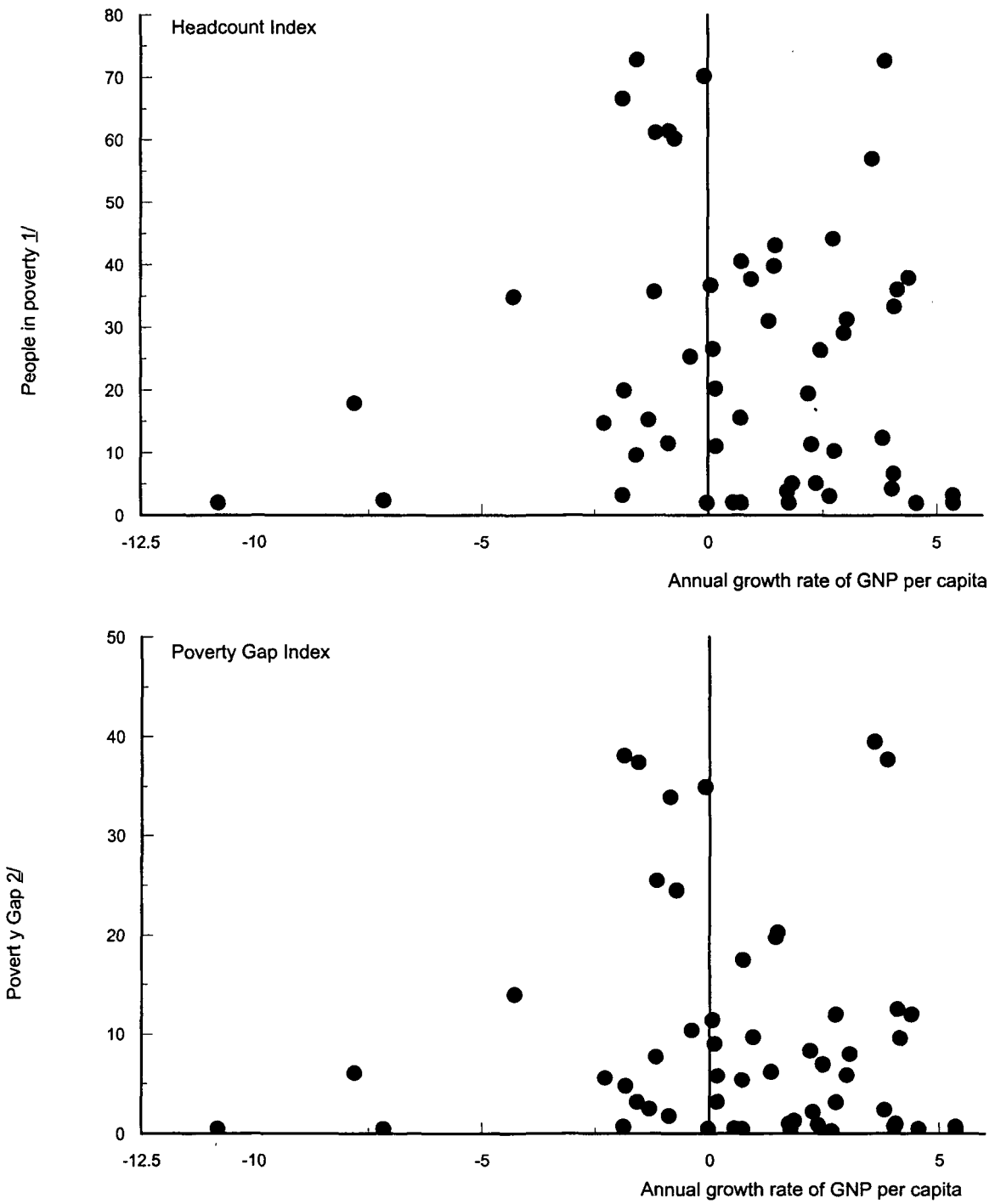
INFL is the annual change in the consumer price index. ILLITY is the log of the illiteracy rate for the youth in percent of total population. LHOSPITAL is the log of the number of beds per 1000 people. GDPPC(-1) is the lagged value of the log of the GDP per capita (purchasing power parity). REALGR(-1) is the lagged value of annual growth of GDP per capita (purchasing power parity). NEGREALGR(-1) (POSREALGR(-1)) is equal to 1 times the absolute value of REALGR(-1) when REALGR(-1) is negative (positive), zero otherwise. NEGGDPPC(-1) (POSGDPPC(-1)) is equal to 1 times GDPPC(-1) when GDPPC(-1) is lower (higher) than GDPPC(-2) , zero otherwise. REALEX is the annual change in the real effective exchange rate index (a rise is depreciation). OPEN is the log of the ratio of the sum of imports and exports of goods and services to GDP (all in nominal terms). LURBAN is the log of the urban population in percent of total population. LTOT is the log of the terms of trade. The volatility measures are calculated as the ratio of the standard deviation of a variable for t, t-1, t-2 and t-3 to the average value for the same period. VREALXL is the volatility measure of the real effective exchange rate. LGINI is the log of Gini index.

Figure 1
Developing Countries: Poverty Measures



Source: World Bank.

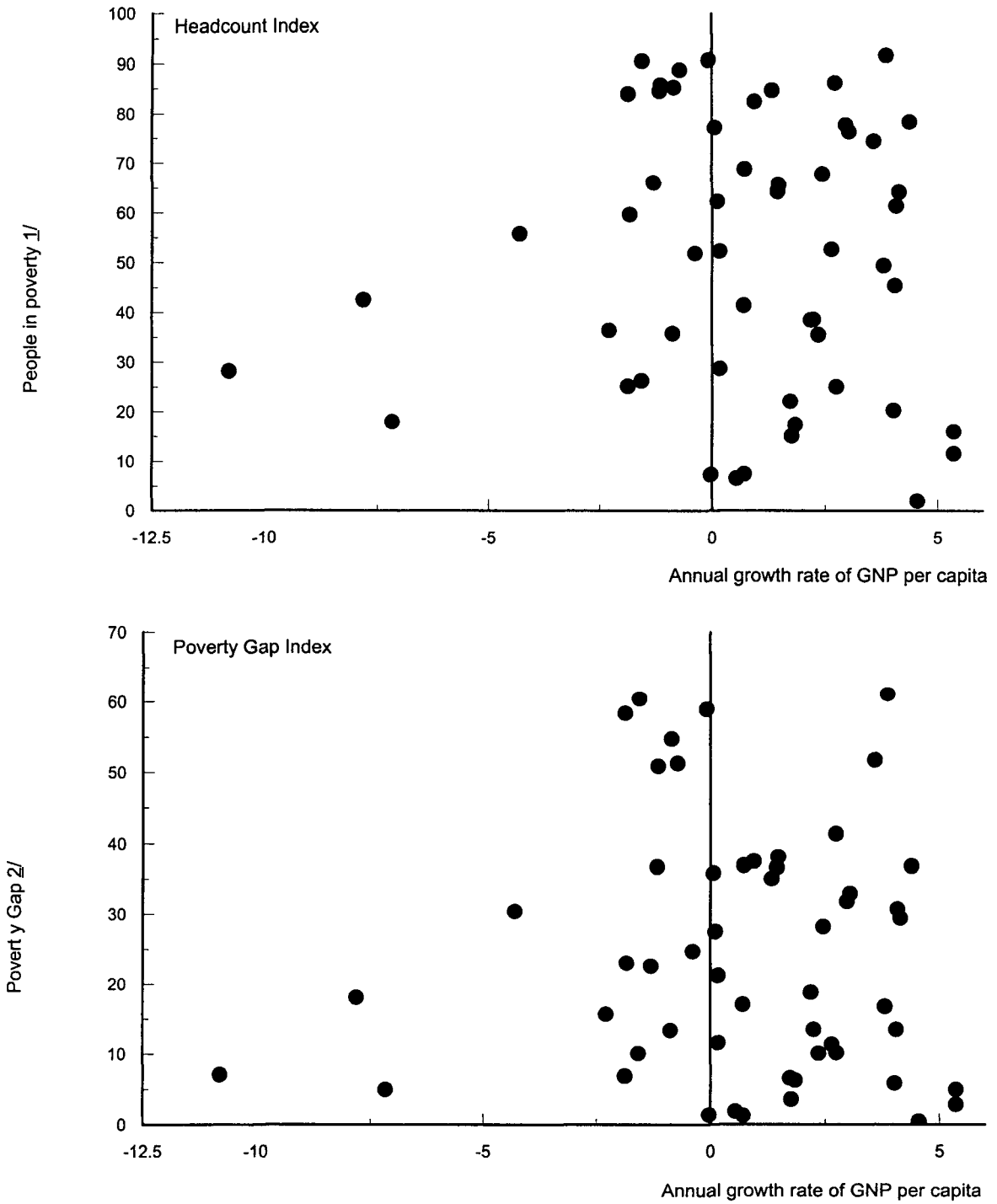
Figure 2
Developing Countries: Growth and People in Absolute Poverty
(in percent)



Source: Table 4 in World Bank, *World Development Report* (2000/2001).

1/ Proportion of the population earning one U.S. dollar or less a day, various survey years.
2/ Poverty gap at one U.S. dollar or less a day, various survey years.
Note: Sample consists of 54 countries for which data are provided in the *World Development Report*.

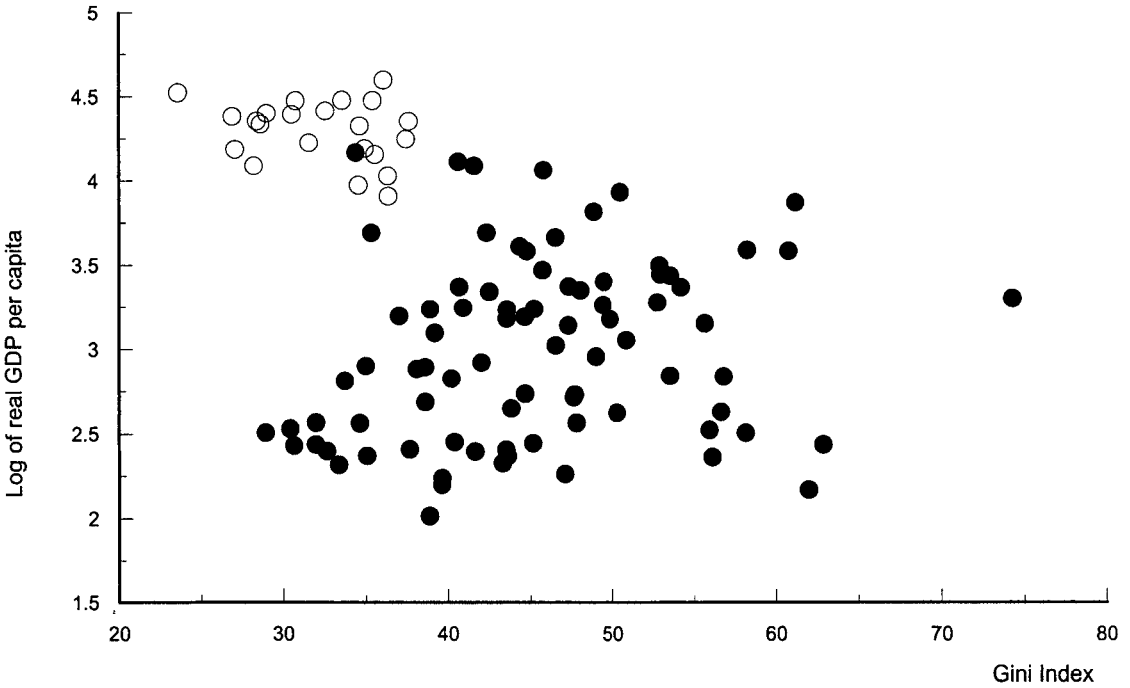
Figure 3
Developing Countries: Growth and People in Relative Poverty
(in percent)



Source: Table 4 in World Bank, *World Development Report* (2000/2001).

1/ Proportion of the population earning two U.S. dollar or less a day, various survey years.
2/ Poverty gap at two U.S. dollar or less a day, various survey years.
Note: Sample consists of 54 countries for which data are provided in the *World Development Report*.

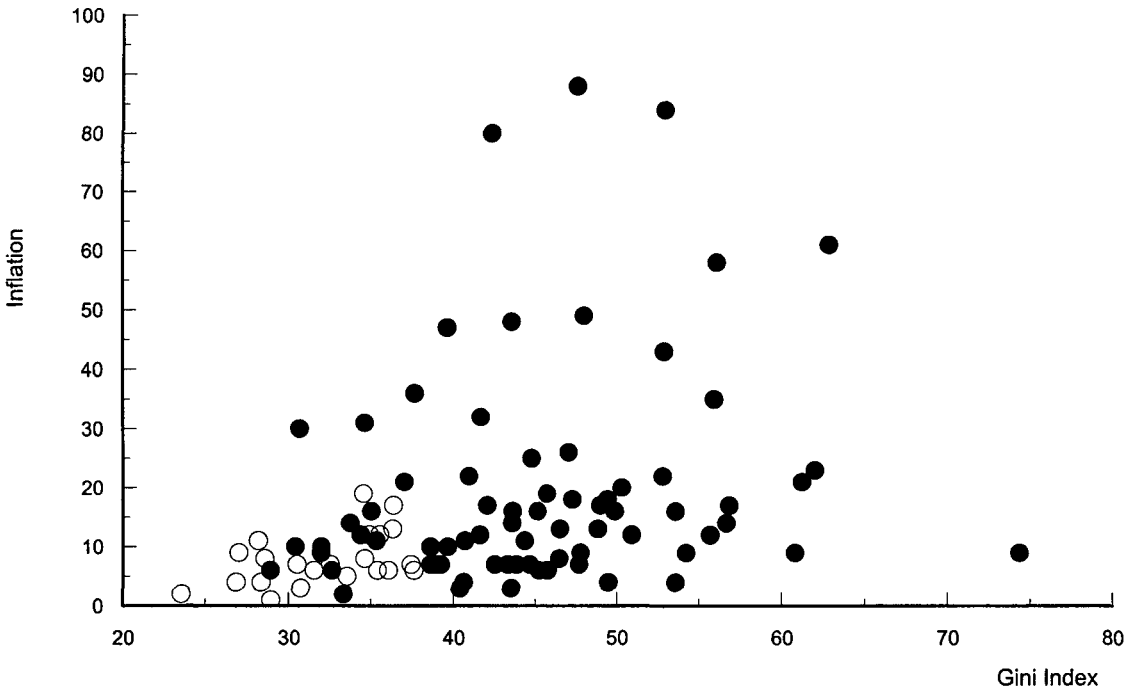
Figure 4
Gini Index and Per Capita Real GDP
(annual averages, various periods)



Source: Dollar and Kraay (2001) and World Bank.

Note: The list of countries includes both industrial and developing countries (countries in transition are excluded from the Dollar-Kraay sample). The light-colored circles represent industrial countries.

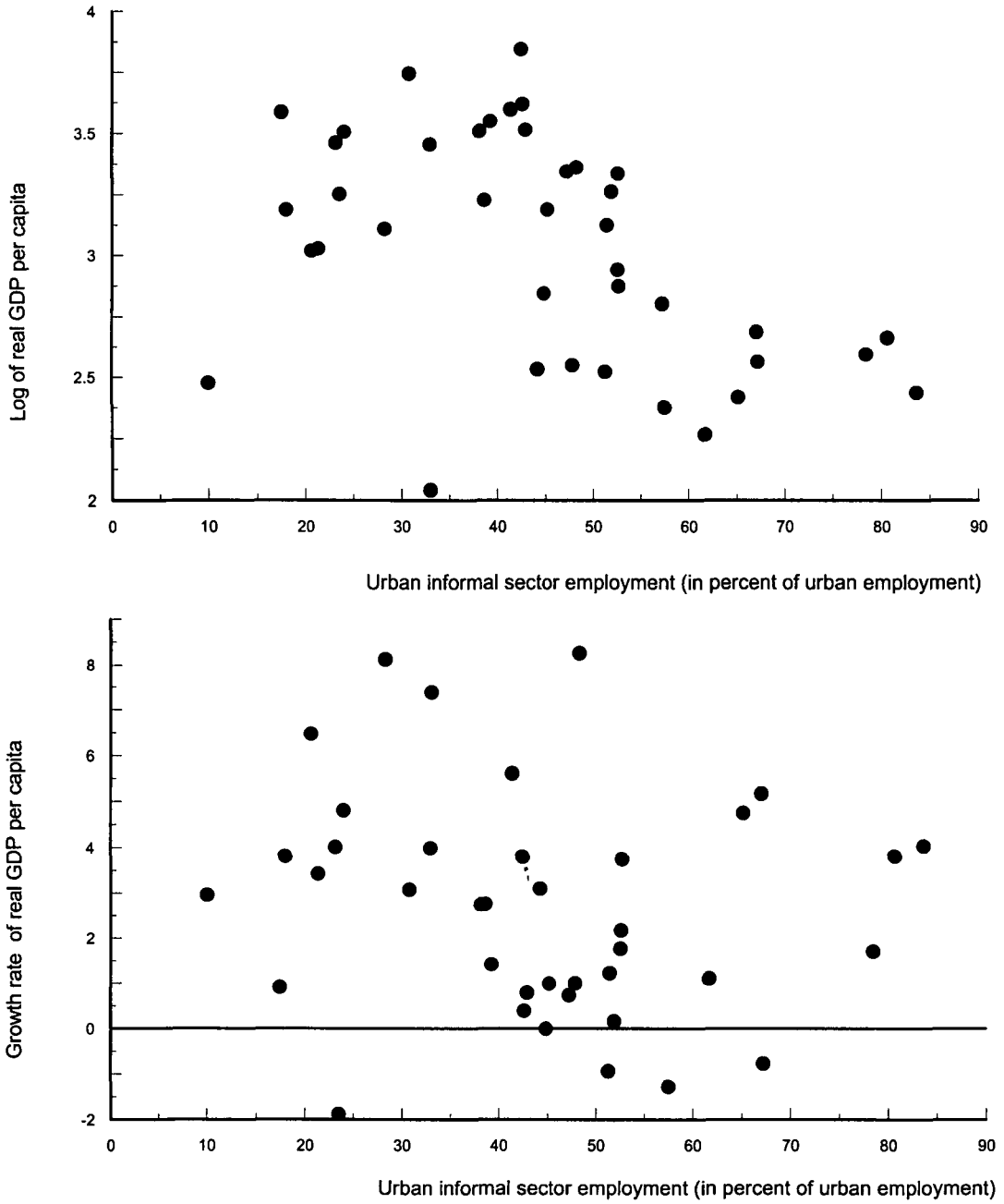
Figure 5
Gini Index and Inflation
(annual averages, various periods)



Source: Dollar and Kraay (2001) and World Bank.

Note: The list of countries includes both industrial and developing countries (countries in transition are excluded from the Dollar-Kraay sample). The light-colored circles represent industrial countries.

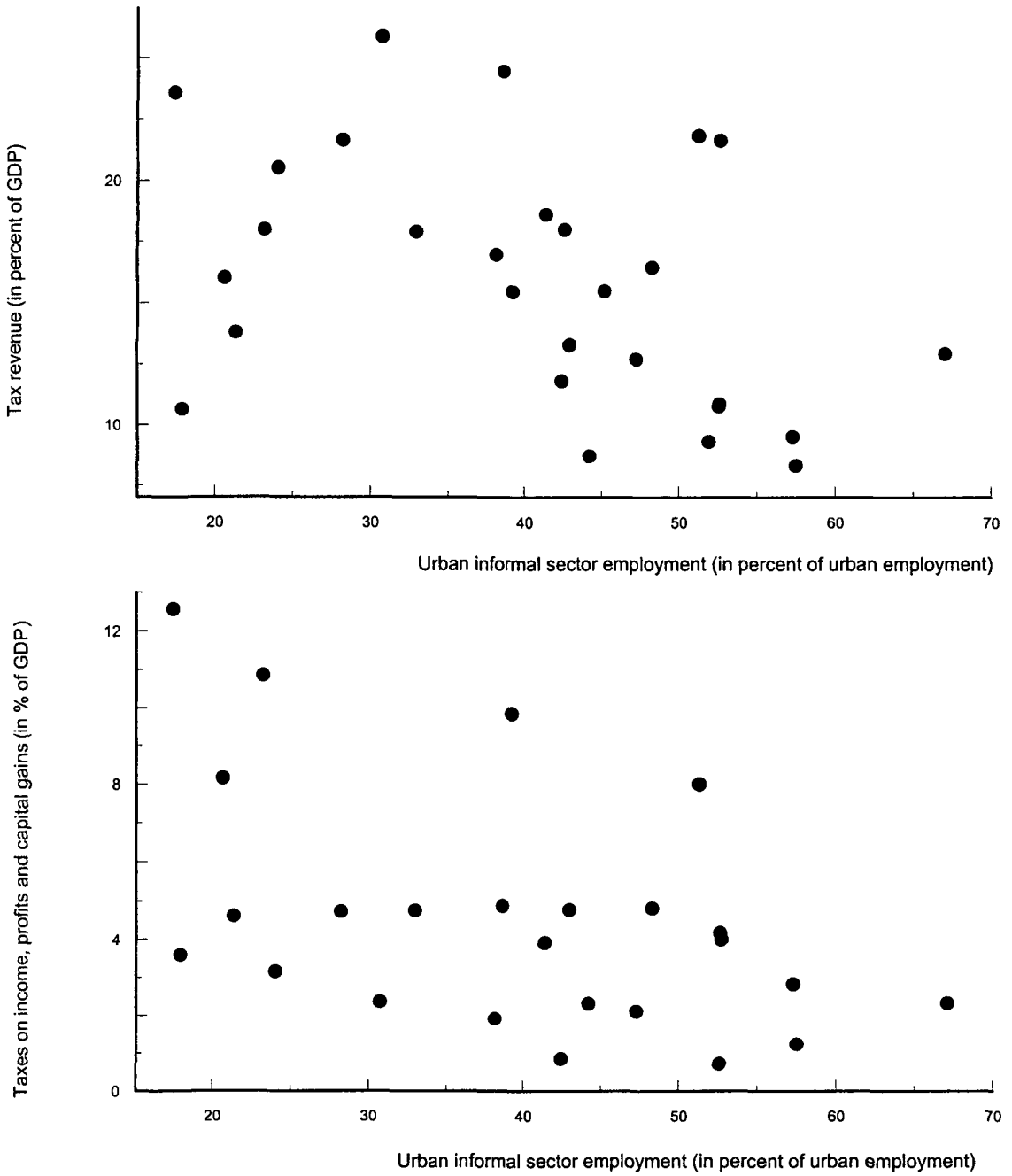
Figure 6
Developing Countries: Informal Sector and Per Capita Real GDP
(averages)



Source: World Bank and International Labor Organization.

Note: The list of the countries is Argentina (1990-95), Bangladesh (1993), Benin (1992), Bolivia (1990-96), Botswana (1985, 1996), Brazil (1990-95), Cameroon (1993), Chile (1990-95, 1997), Colombia (1984, 1986, 1988, 1990-95), Costa Rica (1990-95), Cote d'Ivoire (1996), Ecuador (1990-97), Ethiopia (1996), Gambia (1992-93), Ghana (1997), Guatemala (1987, 1989), Honduras (1990-95), India (1993), Indonesia (1995), Iran (1996), Jamaica (1996), Kenya (1992-95), Madagascar (1995), Mali (1989, 1996), Mauritius (1992), Mexico (1990-96), Morocco (1988), Niger (1995), Pakistan (1992), Panama (1990-95), Paraguay (1990-96), Peru (1984, 1986-87, 1989-97), Philippines (1988, 1995), South Africa(1995), Sri Lanka (1985), Tanzania (1990-91, 1995), Thailand (1988, 1990-95), Tunisia (1981), Uganda (1993-94), Uruguay (1990-97), Venezuela (1990-97), Zambia (1993).

Figure 7
Developing Countries: Informal Sector Size and Tax Revenue
(averages)



Source: World Bank and International Labor Organization.

Note: The list of the countries is Argentina (1990-95), Bolivia (1990-96), Botswana (1985, 1996), Brazil (1990-95), Cameroon (1993), Chile (1990-95, 1997), Colombia (1984, 1986, 1988, 1990-95), Costa Rica (1990-95), Cote d'Ivoire (1996), Ecuador (1990-97), India (1993), Indonesia (1995), Iran (1996), Kenya (1992-95), Madagascar (1995), Mauritius (1992), Mexico (1990-96), Morocco (1988), Pakistan (1992), Panama (1990-95), Paraguay (1990-96), Peru (1984, 1986-87, 1989-97), Philippines (1988, 1995), South Africa(1995), Sri Lanka (1985), Thailand (1988, 1990-95), Tunisia (1981), Uruguay (1990-97), Venezuela (1990-97).

Figure 8

Steady-State Equilibrium

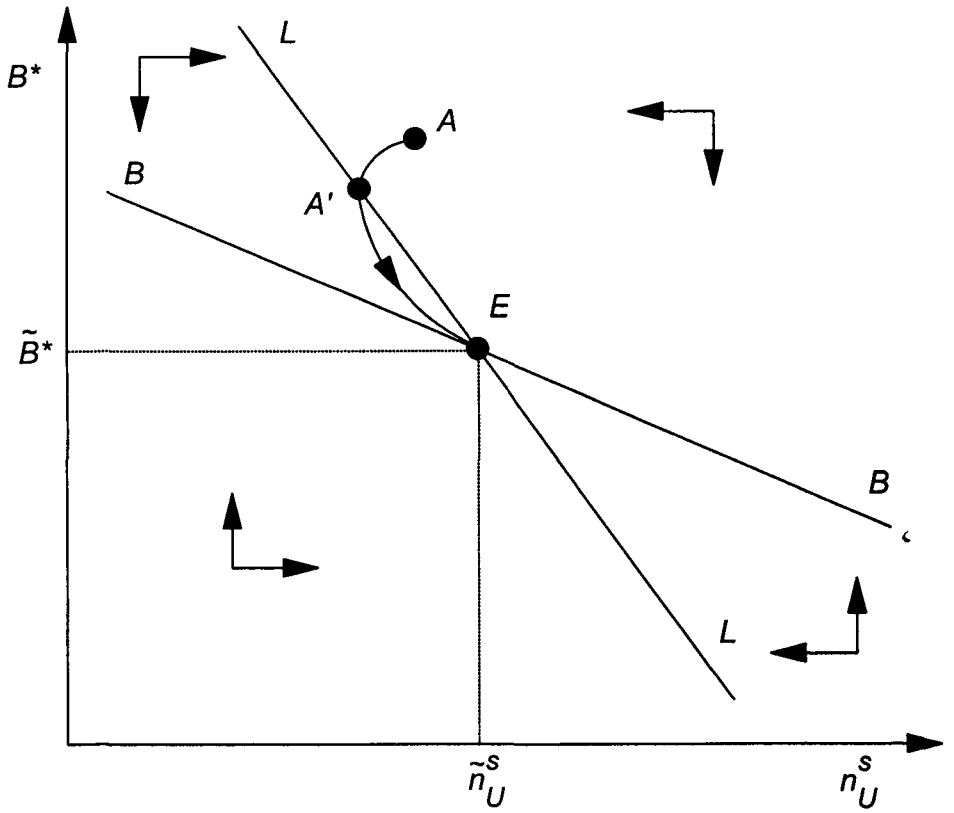
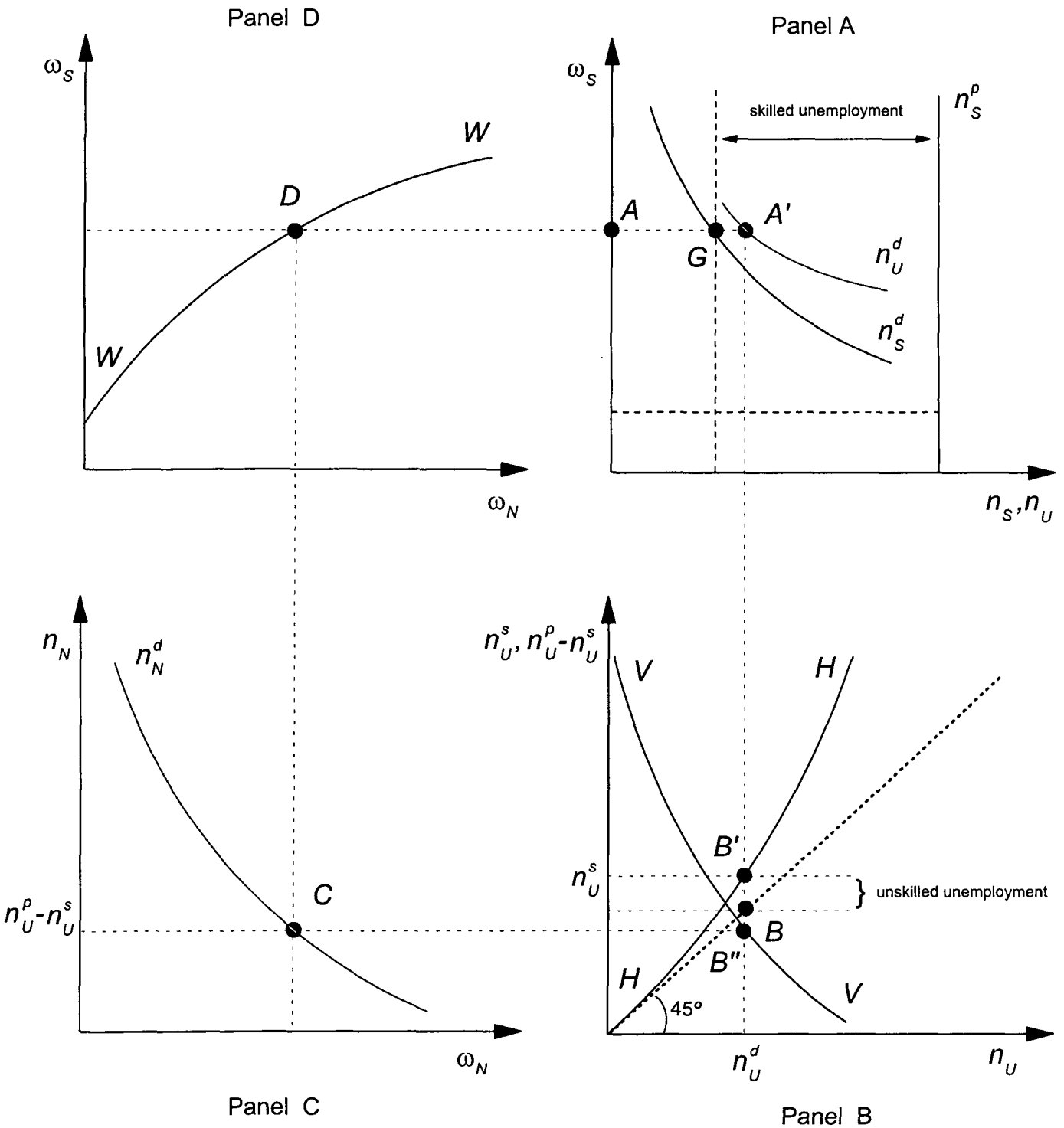


Figure 9

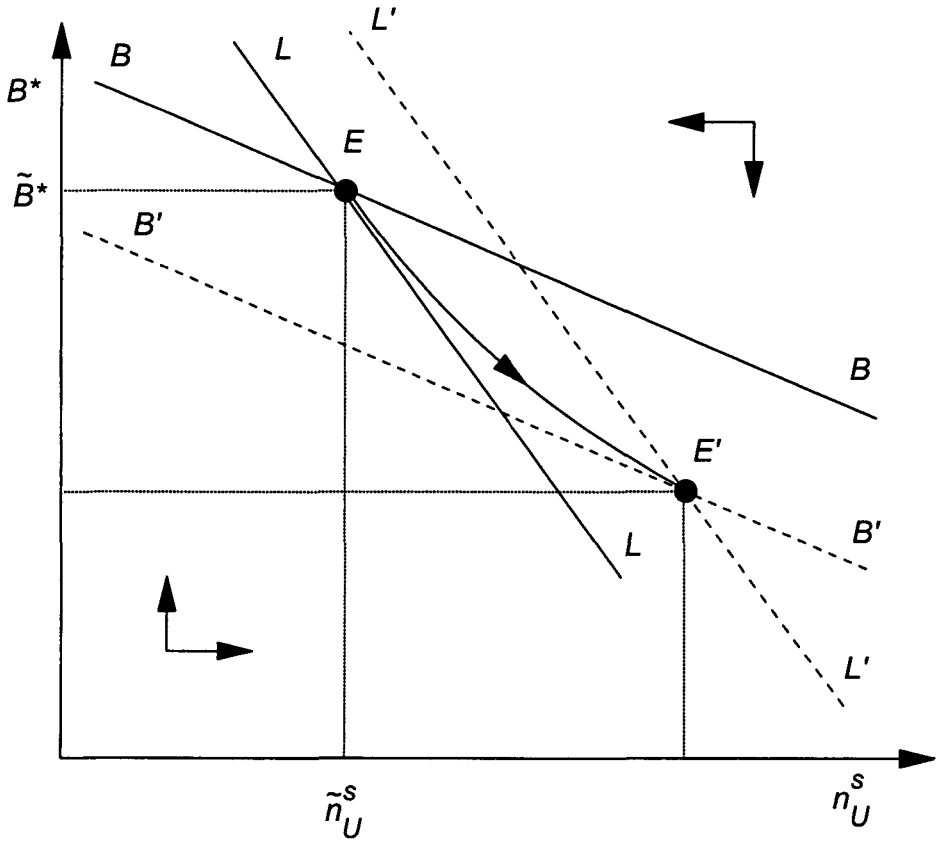
Labor Market Equilibrium



Source: Agénor (1997*b*).

Figure 10

Increase in Lump-Sum Taxes



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